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PC Computing

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—PC MAGAZINE

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"The hot item from a technical point of view is the System 220. This machine runs a 286 processor at 20 MHz, which is its major claim to fame."

—WILL FASTIE, PC WEEK

"...the Dell machine is renewed evidence that the price of 286-based desktop equipment continues to drop rapidly, making such machines very attractive for daily work under MS-DOS even as they hold out the promise of running OS/2 in the future."

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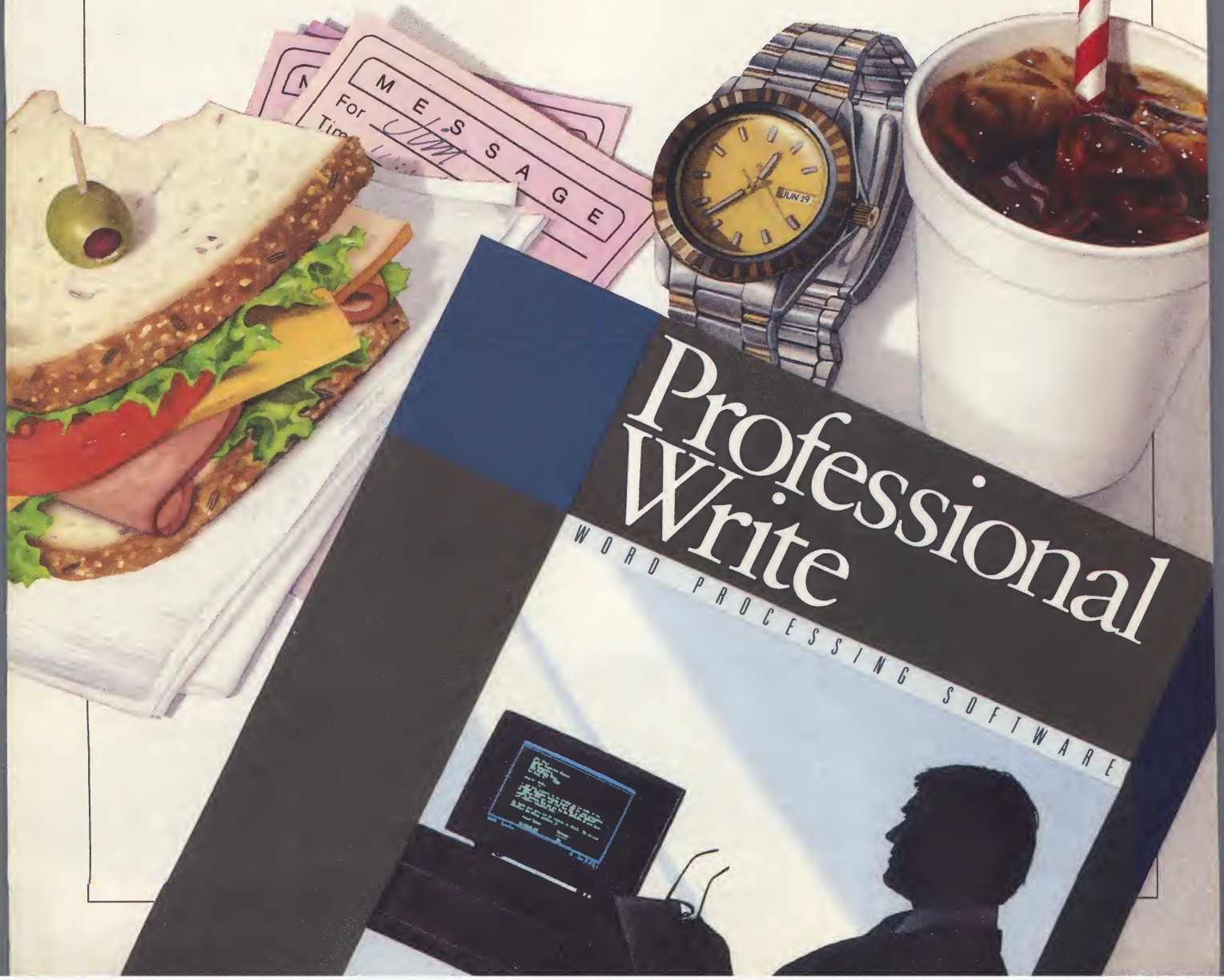

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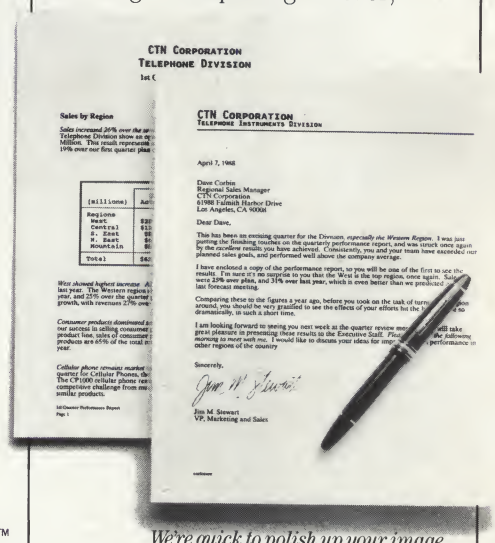

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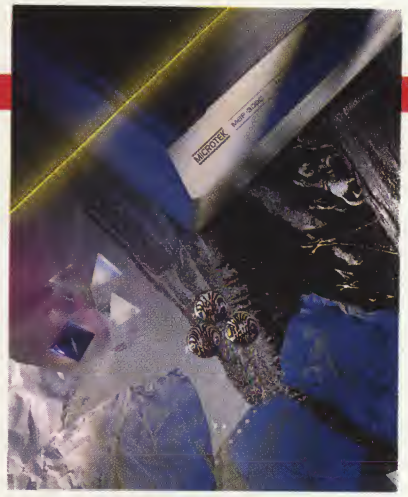

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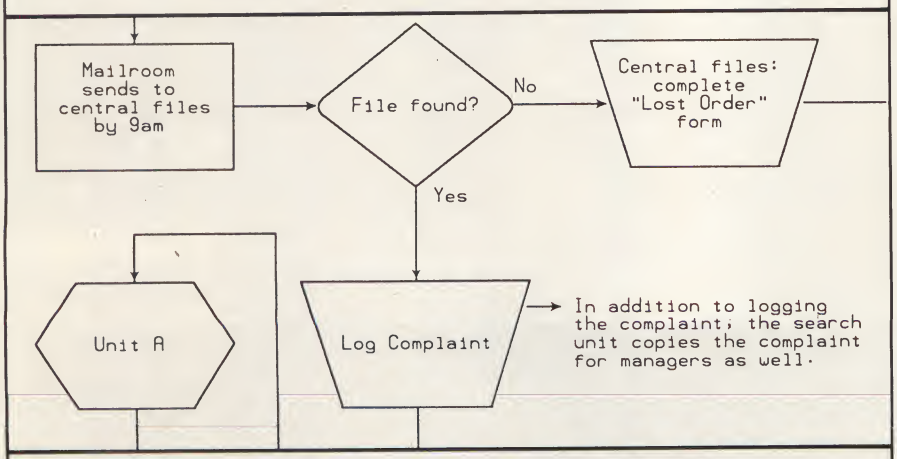

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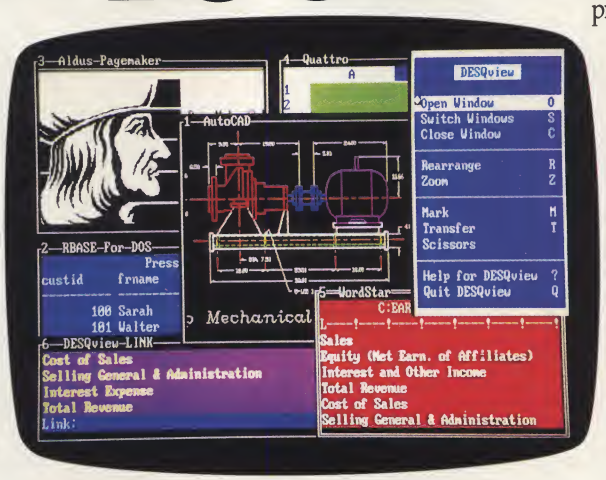

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DESQview even lets you transfer text, numbers, and fields of information between programs.

For programmers, DESQview's API, with its strengths in inter-task communications and multitasking, brings a quick and easy way to adapt to the future. With the API's mailboxes and shared programs, programmers are able to design programs running on DOS with capabilities like those of OS/2.

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If all of this sounds like promises you've been hearing for future systems, then you can understand why over a million users have chosen DESQview. And why *PC Magazine* gave DESQview its Editor's Choice Award for "The Best Alternative to OS/2," why readers of *InfoWorld* twice voted DESQview "Product of the Year" why, by popular vote at Comdex Fall for two years in a row, DESQview was voted "Best PC Environment" in *PC Tech Journal's* Systems Builder Contest.

PC MAGAZINE EDITOR'S CHOICE NOV. 24, 1987

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IBM Personal Computer and 100% compatibles (with 8086, 8088, 80286, or 80386 processors) with monochrome or color display; IBM Personal System/2• Memory: 640K recommended; for DESQview itself 0-145K• Expanded Memory (Optional): expanded memory boards compatible with the Intel AboveBoard; enhanced expanded memory boards compatible with the AST RAMpage; EMS 4.0 expanded memory boards• Disk: two diskette drives or one diskette drive and a hard disk• Graphics Card (Optional): Hercules, IBM Color/Graphics (CGA). IBM Enhanced Graphics (EGA), IBM Personal System/2 Advanced Graphics (VGA)• Mouse (Optional): Mouse Systems, Microsoft and compatibles• Modem for Auto-Dialer (Optional): Hayes or compatible• Operating System: PC-DOS 2.0-3.3; MS-DOS 2.0-3.2• Software: Most PC-DOS and MS-DOS application programs; programs specific to Microsoft Windows 1.03-2.03, GEM 1.1-3.0, IBM TopView 1.1• Media: DESQview 2.0 is available on either 5-1/4" or 3-1/2" floppy diskette.

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CIRCLE NO. 149 ON READER SERVICE CARD.

PERSPECTIVE

At dinner tables across America, two topics are traditionally banned in the interest of domestic tranquillity: religion and politics. But with PCs becoming almost as commonplace as turkey at Thanksgiving, it's probably time to add a third item to the list of taboo topics: user interfaces.

No other issue on the personal computing scene is more likely to touch off an irrational and divisive debate. And none has precipitated such a persistent patter of dogma from people who should know better. It's our version of "Less filling, tastes great."

Contention is hottest where the evangelists of Macintosh-style mice and icons encounter the machine politics of keyboards and text-based displays. The ministers of the graphical user interface preach about ease of learning and ease of use and sing the praises of its ability to handle complex combinations of applications and displayed data. The devotees of the character user interface argue that equipping PCs for graphics taxes their budgets, and they protest that pointing devices put the brakes on experienced speed demons.

What's been more interesting to watch, if less spectacular, is the recent bickering within the almighty mouse camp. Here the dialogue is more refined, but the advocates are no less strident. In this issue of *PC/Computing*, a team headed by Paul Bonner profiles those fighting for the right to provide the graphical environment of choice in the 1990s.

PHOTOGRAPH BY RUVEN AFANADOR

What's easy to forget in all this is that the choice of a user interface is an intensely personal one, like the clothes we wear and the cars we drive. It's a choice that depends not only on what applications one uses but also on such subjective variables as hand-eye coordination, artistic ability, and which side of one's brain is dominant.

That's why I find it so disturbing that some crusaders truly believe there's a single best way of communicating with a computer for all applications and for all users. No organization this side of the army can or should make all users accept the same interface. The notion that a single interface can serve all applications with equal facility seems downright un-American.

My question: Why don't we take the energy being expended on proving that "my interface is The Way" and redeploy it toward finding some common ground? Why can't we preserve the user's critical freedom to choose a personal style of communicating and interacting with one's PC? And why shouldn't we, in the process, make it safe to talk about user interfaces at the dinner table once again?

Michael E. Kolowich
PUBLISHER

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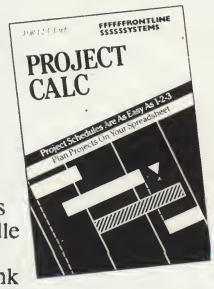

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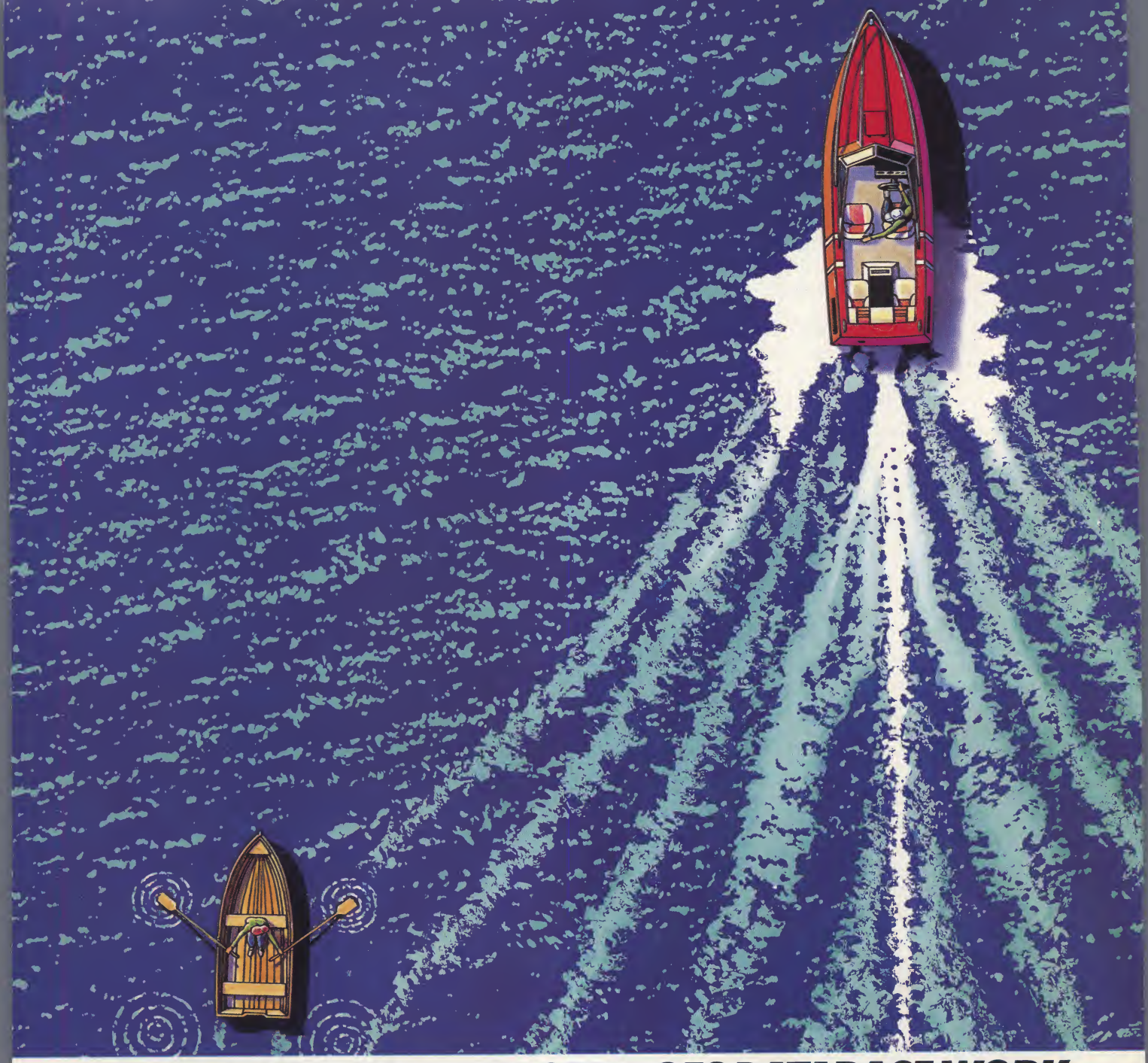

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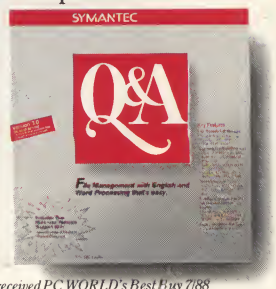

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CIRCLE NO. 162 ON READER SERVICE CARD.

NORA

GEORGAS

As a proponent of the People's Party for the Beautification and Democratization of PCs, I'm thrilled by the mounting interest in more accessible, more intelligent user interfaces for computers.

I don't care if it's file folders, trash cans, or lobster claws—if it makes PCs faster and more elegant to use, I'm for it. For me, whether we end up with graphical interfaces or a whole new kind of text-based system takes a back seat to the importance of at least *looking* at this problem seriously, and to putting our best minds to work on creating exciting new ways for users to interact with computers.

In "User Interface Wars," page 72, Paul Bonner talks about the dream of early PC developers to pack mainframe power into PCs that individuals could afford and use. He writes: "Today, however, the focus of efforts to realize that dream has shifted from attempts to build enough power into a microcomputer to support a simple, text-based interactive interface to efforts to create standardized, high-resolution-graphics-based interfaces for the high-powered machines that will dominate tomorrow's desktops."

What bothers me is that while we're feverishly creating the Ultimate Interface to let people do things easily with PCs, we may not be paying enough attention to what it is people actually *do* with PCs, or what they should be doing with them ten years from now. Could it be that we're creating wonderful, exciting new interfaces to do the same old things?

Picture it: Five years hence, Travis P. User sits down at his 486 PC with flat 20-inch color gas plasma screen, stereo speakers, and a 2-inch-deep CPU tucked away in a desk drawer (we can construct this scenario, of course, because everyone's already given lots of thought to hardware platforms of the future), flips it on, and is greeted with the voice of his choice from the latest version of Open Windows or MacWave or NewLook: "Hi there, pal. Wanna review that budget spreadsheet from last night?" Our man touches the 3-D coconut on the screen (he's working on Puerto Rican coconut export projections for 1993), and he's ready to roll.

Go for it, Travis: slash R for range, F for format, C for currency, type the number of decimal places, hit Return, hit Return again to confirm, and there you go! You've just put dollar signs in front of numbers!

Astounding.

That Sinking Feeling

We all know, or at least hope, that developers will improve the interfaces of applications programs in the next few years, but I have an unsettling suspicion that the new interfaces won't be as friendly, transparent, elegant, and all those advertising copywriter things as they should be. And if that's so, the blame may lie with our preoccupation with making the operating system interfaces prettier.

Even if applications program designers take the hint from interface innovators and clean up their acts (and their interfaces), they'll still just be making it easier and faster to do the things we already do. They'll be sweeping something under the carpet: general innovation and real breakthroughs in what we use PCs to do.

Spreadsheets, databases, word processors, and graphics programs are still the workhorses of personal computer use, and most of us who use them would never want to contemplate life without them. But just as we sit with our compact discs and digital audio tapes and stereo televisions chuckling at our Edwardian relatives' astonishment (and complete satisfaction) with 1906 Victrolas, we should remember the vast unknown of PC applications. There's gotta be more.

So what is it? AI? Expert systems? Sure, but there's something even beyond that. I don't know what it is any more than you do; but if we don't focus resources and energy on extending the frontier of software development, we'll never know.

Pretty, user-friendly interface design could turn out to be a kind of technological Wizard of Oz. Let's just hope there's something behind the curtain.

Nora Georgas

EDITOR

PHOTOGRAPH BY RUVEN AFANADOR

Get naked

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To celebrate the shipment of our two millionth mouse, we took the covers off our winning technology.

But this mouse is a lot more than just a pretty case. It's compatible with virtually all mouse-based programs, plus you can program it to "mousify" any keyboard-based application. And it doesn't need resetting when you switch programs.

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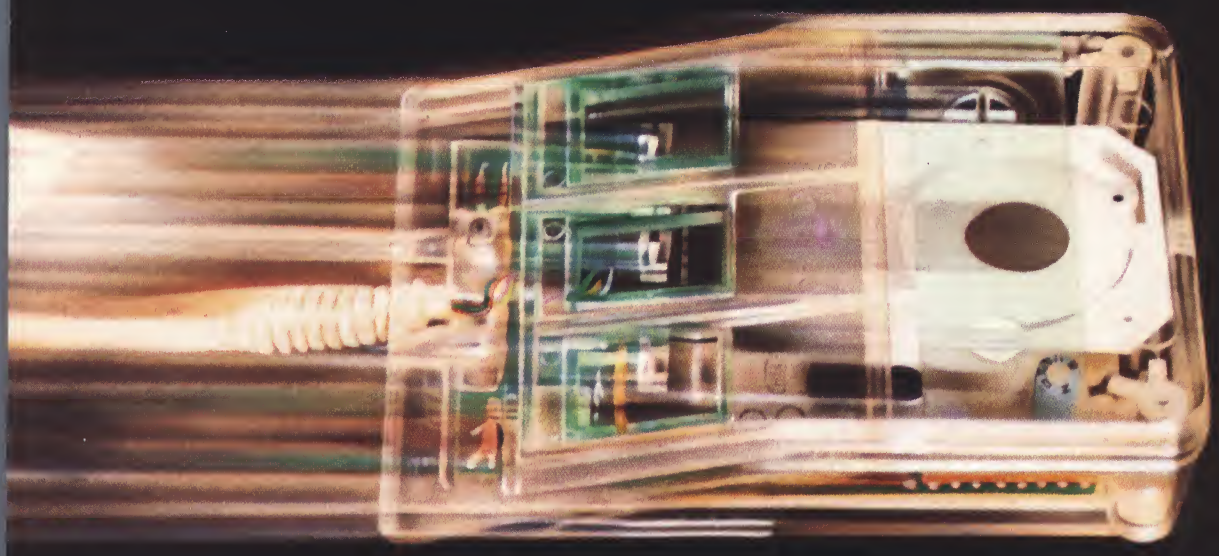

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NLQ

NEAR LETTER QUALITY

DTP Made Cheap

I applaud your article on word processors as low-end desktop publishing systems ("Great Looking Pages," August). Most PC journals recommend the most "feature-rich" products without concern for our budgets (time or money). And most desktop publishing packages don't handle long documents well and are pretty weak for editing.

Donald E. Lammers
Golden, Colorado

Pulling a File Out of a Hat

While using the *PC/Computing* DIRectory Magic disk, I inadvertently tried to move a file to a nonexisting directory. Guess what? The file disappeared! Unforgivable.

R. Gordon Seeley
Brick, New Jersey

It didn't disappear; it's just masquerading under the name of your missing subdirectory. You should be able to find it in your root directory. DIRectory Magic—like DOS's Copy command—treats a nonexistent directory specification as a filename and puts the file into the root directory. It may be a little confusing, because no error message is generated, but it's not unforgivable.—Ed.

Words ImPerfect

While I'm glad Patrick Bedard had a spare evening to glance at WordPerfect ("WordPerfect's Latest," August), the logic behind his conclusions eludes me and may delude others. He suggests, "To my mind, what we should all be after instead [of ever more powerful software] is software that does exactly what we need and nothing more, because that would be the easiest and fastest tool."

No matter how impractical that statement is, it's certainly true. Just as soon as we're all clones, I'm sure the manufacturers will gladly produce just what we all need and nothing more.

Until then, the best they can do is provide a large enough package so that each of us can pick the features he wants and ignore the rest. I've only used the Table of Contents function once in two years, but I found it delightfully easy to use. WordPerfect also gave me a macro tool with which I've built 250 macros to eliminate routine menus and operations. And Keyboard Redefine let me switch parentheses with brackets so that I can type "( )" without a shift key.

Don Ellis
Sheung Wan, Hong Kong

Patrick Bedard claims, "An onscreen tally of lines is far handier [than measurements in inches]." WordPerfect allows the measurement of your choice. The manual describes the options. He had problems with the cursor movement and numerous key commands. Did he know that you can easily define the keyboard to your own satisfaction? Want only ten commands? Pick out your favorite ten and put them on the function keys or on the other keys of your choice. Some time spent learning macros will solve most of his other complaints, such as wading through menus. I'll vote for more power every time and then choose to learn about what I need.

WordPerfect is the Ferrari of word processors, Mr. Bedard. I'm surprised you weren't enthralled.

C. Richard Stone
Ocala, Florida

Let 1,000 Comdexes Bloom

Thank you for Paul Somerson's look at the present/future. Even on a Monday morning, his column had me in stitches after each paragraph.

Martin Capages, Jr.
Oklahoma City, Oklahoma

In his September column Paul Somerson refers to the "millennial Comdex" taking place in the year 2000. Actually, the third millennium will not begin until January 1, 2001.

Roger Smith, Jr.
Fort Walton Beach, Florida

Herculean Counterpoint

In "Herculean Effort" (New!, September), Winn Rosch states that the Hercules Network Card Plus "saddles you with a video standard left over from the lost generation of computing . . . " Actually, the Network Card Plus is an advanced video card that features our unique RamFont mode (a fact Rosch neglected to mention). All of the programs featured in "Great Looking Pages" (August), for instance, run best on a RamFont card.

Rosch also claims that the Network Card Plus "saddles you" with a "network that slugs along at 230 kilobits per second." He fails to mention that the card will also operate with the TOPS "Flashtalk" speed of 768 kilobits per second. But even at the slower speed, the user cannot discount the fact that the Network Card Plus and the TOPS software are targeted as easy and inexpensive alternatives to more expensive networking solutions.

James C. Harris
President and CEO
Hercules Computer Technology, Inc.
Berkeley, California

E-Mail by the Numbers

In the article "Electronic Mail Comes of Age" (August), the MCI Mail telephone number that appears on page 162 is incorrect. Although it does reach one of our independent agents for MCI Mail, it is not the MCI International/MCI Mail number. Our number is 800-444-6245. In Washington, D.C., it is 202-833-8484.

Jane Levene
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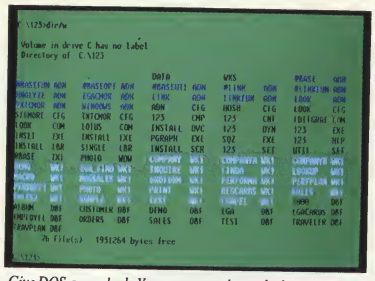
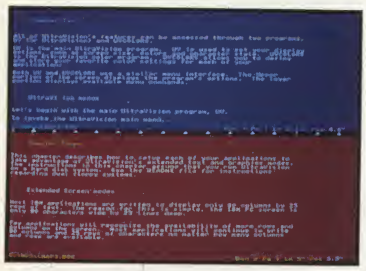
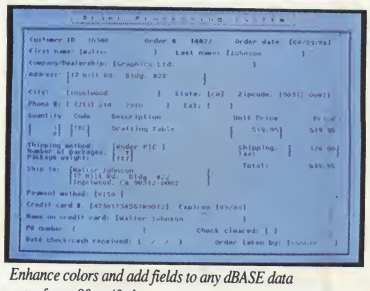


Give DOS a new look. You can even color code directory listings by file extension.

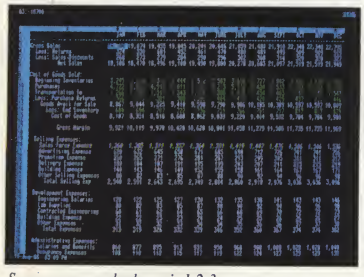
See more on the screen when you write code or review program listings in editors like Brief. 120 × 43 shown.



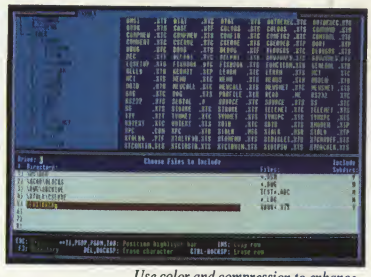
Change fonts, colors and screen sizes in popular word processors like WordStar & Word Perfect. 80 × 60 shown.



Enhance colors and add fields to any dBASE data entry form, 80 × 43 shown.



See more rows and columns in 1-2-3 or Symphony. Build a 12-month forecast without scrolling left and right.



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NLQ

By WordStar's Light

Your September issue in effect labels WordStar 2000 a loser ("WordStar Goes Professional"). Commercially speaking, you may be right, but all your readers who are blindly buying up WordPerfect should know that they are missing out on a program that is much easier to use, just as fast in most respects, and just as powerful. And, in my area at least, WordStar is cheaper.

Curtis Croulet
San Diego, California

DOS: DOA or AOK?

Thank you, John Dvorak ("Is DOS Dead?," August), for recognizing that a great number of PC enthusiasts are continuing to use their 8088-based machines and cannot justify, for whatever reason, moving into the OS/2 era of equipment and vaporware.

Dale T. Hostetter
Sylmar, California

"Is DOS Dead?" misses, in my mind, an important point. Is Microsoft really trying to kill its proverbial goose that laid the golden egg? It seems to me that rather than setting another standard to replace MS-DOS, Microsoft is segmenting the market out of necessity.

A new system is needed to counter the Mac II's inroads into the business market. This explains the Presentation Manager's similarity to the Mac interface.

A new operating system is needed to tap the potential of Intel's 386 and to free software developers of the 640KB barrier imposed by MS-DOS. But who will need this much power? Not most hackers. Not the average hobbyist. Not the public schools or struggling mom-and-pop businesses or even large corporations, for many applications.

Even if the price of the 386 hardware, stuffed with meg on top of meg of RAM, drops many-fold, what will entice users to abandon their hardware and libraries of MS-DOS-specific software? Those power users in the business who need OS/2 will buy it. Meanwhile, the rest of us will sit on the sidelines supporting MS-DOS.

T.C. Banks
Virginia Beach, Virginia

In "Is DOS Dead?" John C. Dvorak mentions several "also-rans and dubious alternatives" to OS/2. Though he spoke about Digital Research's GEM, he did not bring up its Concurrent DOS/386. I have seen reviews and editorials claiming that it is excellent.

He also states that THEOS offers nothing "that can't be matched or beaten by Xenix." I use Oasis (the predecessor of THEOS) daily. While indeed it is incompatible with DOS, THEOS is much easier to use than Unix or Xenix. If you don't need DOS compatibility, Oasis/THEOS is a great operating system for small- to medium-sized multiuser systems.

Angelo Babudro
Palmdale, California

Since Dvorak is so knowledgeable about this field, I find it difficult to understand his apparent total ignorance of a feasible alternative to OS/2, Concurrent DOS. I have been using the current version in my XT clone for half a year and have no cause for regret.

Not only can I run four MS-DOS (or CP/M-86) programs concurrently (each window capable of reserving 464KB), I can multitask without incurring the costs of "updating" to a 386. I have the option of switching to MS-DOS if necessary. But after using Concurrent DOS, I feel positively crimped by the brain-damaged limitations of MS-DOS.

Fr. Winston F. Jensen
Superior, Wisconsin

Hawking: One More Time

As the editor of *Peoplenet,* a nationwide networking/singles newsletter for disabled and nondisabled men and women—and as a disabled person—I would like to say "well done" on including Charles Fox's article, "Stephen Hawking: A Man for All Time" (August).

It not only shows the *ability* of disabled people, but our humanity as well. It shows that we too have the potential for greatness and great things. And like anyone else, all we need is the opportunity to show that to the world.

I must also say well done in assigning Charles Fox to the article since he is disabled as well. He certainly had the right insight into Hawking's universe.

Robert Mauro
Levittown, New York

I was disappointed by the dumb questions put forth by Charles Fox. I kept hoping for a glimmer of how this genius perceives our physical universe. What I got was "What is the nature of reality?" "What is the nature of the mind?" These are queries which should have been asked of a psychiatrist, not a physicist.

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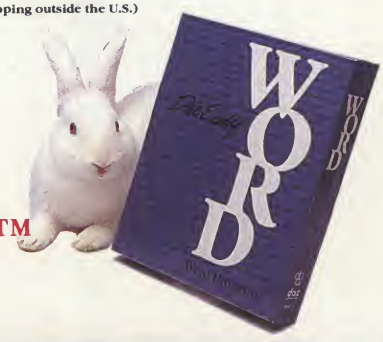

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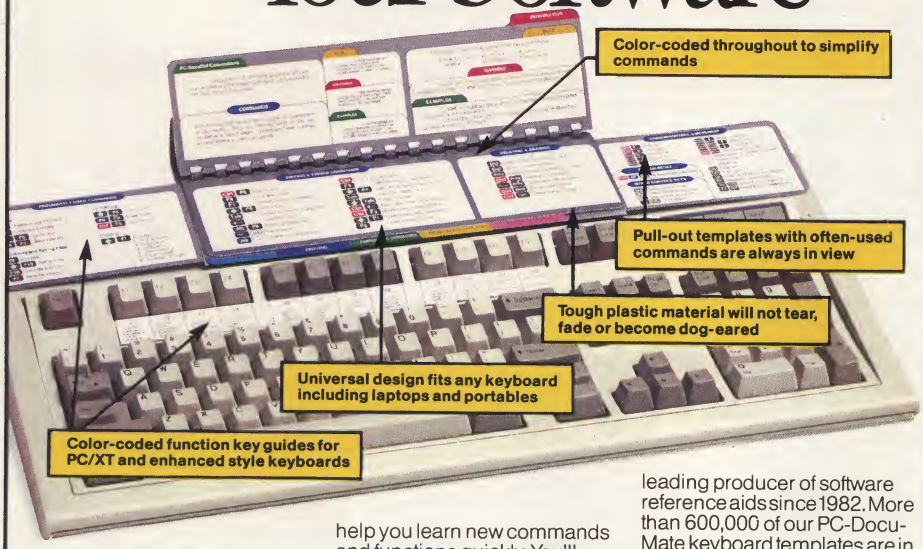

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NLQ

If you have a further conversation with Dr. Hawking, perhaps you should ask these questions:

- How would a human perceive infinite space-time curvature?
- Is it possible that infinite space-time curvature is actually no curvature at all?
- Would time-travel be possible by, say, creating infinite space-time curvature through attaining light speed?

Robert M. Segal
York, Pennsylvania

Battle of the Titans

I am happy to see *PC/Computing* is not another "clone" magazine. Of particular interest is the point-counterpoint format of the Seymour vs. Dvorak column. The authors recognize that not everyone needs the product being reviewed—many product reviews assume you need the item and read like an advertisement from Lotus Development or Ashton-Tate.

Bob Jarman
Jacksonville, Alabama

The Wonders of Word

I enjoyed your debate about Microsoft Word ("Seymour vs. Dvorak," September). But in listing Word's virtues, you omitted one of the best: the mouse. For moving, deleting, grabbing text for editing, and scrolling without those annoying breaks in the middle of paragraphs, the mouse (and Word) gnaw WordPerfect to bits.

Also, Microsoft Word's ease of printer selection and setup puts WordPerfect to shame.

Bruce D. Wedlock
Cambridge, Massachusetts

Weather: Watch This Space

The September issue featured a well-written article on weather-tracking software (Connect), which I read on the day I returned from a kayak trip to Tennessee. We drove three days and traveled 1,500 miles but couldn't find enough water to float a rubber duck. The WeatherBrief software package you reviewed would have saved me and my crew a tremendous amount of time, money, and aggravation on that trip. I must gain access to this telecommunications link.

Timothy L. Bock
Garret, Indiana

For more information, write or call WeatherBank, Inc., 2185 S. 3600 West, Salt Lake City, Utah 84119; 801-973-3131 or 973-3132.—Ed.

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JOHN C. DVORAK

He once answered the phone, "Dictronics, this is Dick speaking!" That was Dick Brass then: the affable ex–special features editor of *The New York Daily News,* restaurant critic, rich kid. The kid who sued Rupert Murdoch for double-dealing and won $140,000, which he turned into Dictronics, Inc., the company that originated the electronic thesaurus and which he later sold to Wang Computers for $5.5 million. He eventually used that bonanza to help finance General Information, Inc., with hotshot writer Cary Lu. Together they now sell the National Directory of Addresses and Telephone Numbers and Hotline II, the superb electronic phone book and dialer software for IBM compatibles.

Brass, 37, now lives on Lake Washington in Seattle with a boat in the backyard that he can cruise to Bill Gates's dock or Steve Ballmer's dock or any of the hoity-toity mansions that surround the enormous lake on which all the rich and famous of the Pacific Northwest dwell. He is losing weight, thanks to three factors: (1) he no longer reviews restaurants for a living; (2) he lives in Seattle; and (3) he gets rugged exercise by lugging a solid gold Rolex on his left wrist 16 hours a day. Thank goodness for his rigor, because this business needs more people like Brass: creative, energetic idea guys with an interesting vision of the future.

Brass believes, with some credibility, that data will be the next important microcomputer software commodity. He foresees a world where "desktop marketing" dominates. All the complex selling techniques used by big companies years ago with mainframes will be used by the smallest firms with micros. The advantage of the big corporation will shrink to nil once we realize that the small machine can do it all. Brass intends to be in the center of the action.

"For some reason I've developed a knack for finding a way to put printed material into forms usable by the computer," says Brass. It all began when he decided he wanted to improve the dictionary provided with Spellguard, the original spell-checker that ran on old CP/M computers. He was shocked to find "misspell" spelled "missspell." Further research found hundreds of similar blunders.

As an editor at the *News,* with decent contacts in New York, Brass decided to ask Random House for a mag tape of *The Random House Dictionary.* He intended to download it to his machine as the Spellguard dictionary. "Suddenly it dawned on me that the electronic version of their dictionary was probably worth something to people who needed a real dictionary for those early spell-checkers. When I asked the rights guys about electronic rights, they had no idea what I was talking about."

Brass realized that he had stumbled onto a gold mine. Quickly, and for a song, he grabbed the electronic rights to *Roget's International Thesaurus* (which is now owned by Wang and has yet to be exploited), *The Random House Dictionary,* and dozens of other references. He then invented the classic thesaurus interface, and he's influenced many current user interface innovations. He's still looking for ways to exploit directories and large databases.

In his home on Lake Washington, Brass revels in tales of the good old days. He seems stalled, though. His vision of the future depends on technologies that aren't moving fast enough. CD-ROM, for example, should have rocketed three years ago but has failed because of expense and lack of creativity. Software vendors can't find a way to use 500MB of storage. Brass can find a way, but there's no demand, because nobody bought CD-ROMs.

So he waits for something to happen. His company prospers, but he needs the big score to be fulfilled. Meanwhile, he'll bide his time among the movers and shakers on Lake Washington.

When things break for the hidden market he sees for raw data, again we'll hear those words: "Dick speaking!" It will be a loud and forceful voice. We'll be listening.

Imagine a world of "desktop marketing." The advantage of the big corporation would shrink to nil.

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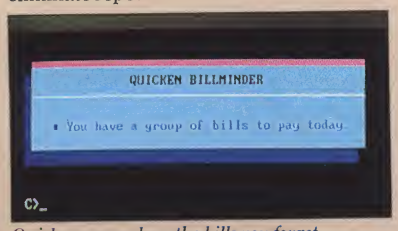

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ESTHER

DYSON

Compiler: a computer program that takes as input a complete program written in a high-level programming language (the source code) and translates it into a machine-language program that the computer can execute.

Interpreter: a computer program that translates and executes each source language statement before translating and executing the next one.

Since I never took a computer course, I learned the difference between interpretation and compilation through example and experience, not definitions. I feel it in my gut.

Compilers take long code listings and turn them into machine code, all in one long process. By examining a body of instructions and organizing them efficiently, the compiler can optimize the sequence of a program. By contrast, interpreters work on an incremental basis. Anything you give them, they handle right there. Write one line of BASIC and run it. The system will go through it as many times as you ask, but it won't gain insight.

Take a roundabout set of directions to someone's house. The interpreter does as told: go west, then north, then east. It goes out of its way, but it gets there. The compiler waits until the end to find out where it's going and takes the shortcut due north.

The way to change a compiled application is to change the source code and then recompile the whole thing. The way to change an interpreted program is to change a single statement on the fly. In essence, compiled programs run fast but change with difficulty; interpreted programs run at a slower rate but are more adaptable.

The compiler/interpreter dichotomy goes far beyond software: it's a fundamental character principle, as significant as Types A and B. Some people create their personalities through compilation, others through interpretation, of new events. They express those personalities in "applications"—the way they handle everyday events.

The compiler/interpreter dichotomy goes far beyond software: it's as significant as Types A and B.

Interpreters take things as they come, and every day they get wiser. Show them something new, and they'll try it. Compilers are slower to change their minds. Tell them something new, and they'll write it down. They won't believe you, but they'll remember it—and someday they may dredge it out.

Interpreters lose or gain faith gradually. Compilers, when they do change, go all the way. A compiler might drop everything to move to Tahiti with a new love and a bucket of paint. An interpreter in search of adventure would join a health club.

Children, of course, are interpreters. Everything they see and hear is new information to be interpreted as they create themselves.

But then one day, as every parent knows, a child suddenly becomes "run-time-mostly." His character is fixed, like a canned Lotus 1-2-3 model: you can give him data, but you can't alter his essential structure. The child is now an application that acts on the information, rather than an interpreter that absorbs it. Only extraordinary events affect grown-ups.

Compilers and interpreters have different approaches to work but can't always be sorted out by occupation. Still, it's pretty clear that movie directors are compilers, while theater directors are usually interpreters. Novelists are compilers; columnists are interpreters (which is why their collected works are so frequently disappointing).

People can vary over time or in particular areas. Broad-minded interpreters can turn into hard-headed compilers as they grow older.

Compilers can incorporate subroutines by reference, building them into an application's structure. Interpreters call up macros: "Ask my wife. She handles our social schedule." Of course, some people are themselves subroutines or macros; they can't do much by themselves, and they're wallflowers at parties.

So the next time you meet someone at a party, be sure to ask . . .

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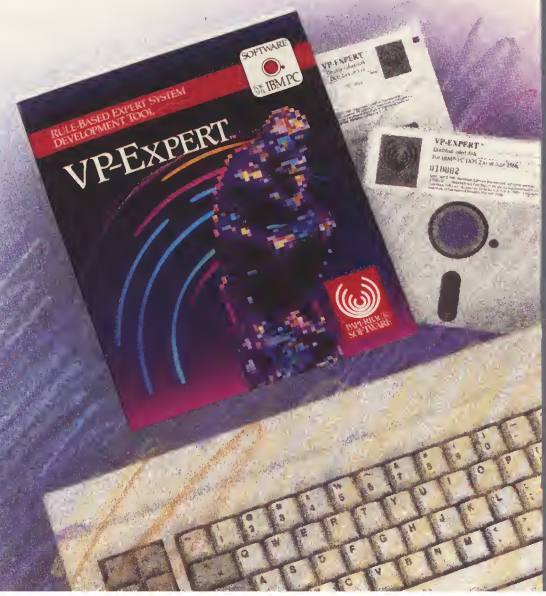

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PAUL SOMERSON

I like a good demo as much as the next guy. But I knew we were in for a long afternoon when I saw the taut, tanned PR types ripping open cartons of flip charts and snapping on overhead projectors. Didn't I have some overdue root canal work?

I spotted my old programmer buddy Murphy at the back of the crowd and yanked him out the door just as the CEO launched into his pitch. We found an unused Yamagazi Turbo 286 across the hallway.

"Hey, Murph, I didn't know you worked on this program."

"Yup, me and 250 other top-dollar Forth and Modula hounds. Here, check this out." He slid a disk into the drive and flipped through an endless sequence of menu screens.

"Which part did you write?"

"Just a second, here it comes . . . there!" The screen cleared.

"What am I looking at? The monitor just went blank."

"That's it. Took six months for my team to get that clear-screen routine down. It wasn't too bad on genuine IBM hardware. But some of the clones and drones were tough—it was a real bear on the Displaywriter. And optimizing it to work on the Sanyo wrist computer dragged in a ton of extra code. You gotta run on everything these days. Anyway, let me show you the rest of the program."

He tapped the Enter key a few times. The thing was locked tight. He rebooted. Same story. I cleared my throat. "Is this a beta version?"

"Nope, it's shrink-wrapped. Being released today. Guess it just doesn't like Yamagazis."

We both knew what had happened. Going through DOS to do anything is so painfully slow that all programmers these days write directly to the chips. And the chips they use as models are the ones on IBM motherboards. They Texas-test the code (on Compaqs, Dells, and Tandys). But it's impossible to try every last mongrel system out there.

Going through DOS to do anything is so slow, programmers these days write directly to the chips.

Murphy smiled sheepishly. "What are you running these days?"

He touched a nerve. "An IBM AT with a fast hard disk."

"Are you serious? I expected you'd be running a rocket ship from Compaq. Or at least a lickety-split IBM 70."

He had a point. Who wouldn't want a system that cruised at 25MHz? And these days you need something really crammed with RAM to handle all the bloated, modularly written code that programming teams crank out.

"Well, Murph, I know everyone hates IBM, but it still makes the best keyboards by far, and I spend most of my day typing on one. Besides, I have so many oddball peripherals hooked up to it, and I run so many tricky programs, that IBM is the only safe way to go."

"Why safe?"

"Because all manufacturers at least make sure their stuff works on IBM equipment. I install lots of new boards and software, so when things inevitably crash I can eliminate the system as the source of the problem. If I were using a clone, I could never be sure."

"But IBM looks awful on a price/performance basis."

"That's like saying, why buy a car that can go 120 MPH when you could go 140? Who cares, if everybody drives at 65? I don't mean to be an IBM apologist, but if you must pick a standard, IBM's a safe bet. It may cost more, but the extra cost pays for peace of mind."

"So why don't you buy a PS/2?"

"First, all the add-in cards I get run on the AT bus. Second, the stuff IBM is pushing comes with 3½-inch disks that give everyone trouble. Third, most PS/2s have too few slots. Nobody's taking the MCA bus seriously. IBM has finally produced a system that's not IBM compatible. Anyhow, I have an accelerator board in my AT that gooses up the performance, and another that provides a better VGA than IBM's. Why get stuck with an orphan system?"

Murphy shrugged. "I'm using an AT too. It's a classic. Wouldn't trade it for the world. IBM may be smart, but it forgets what people want—the soul of an old machine."

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CIRCLE NO. 299 ON READER SERVICE CARD.

JOHN C. JIM

D VS S

VORAK SEYMOUR

Character-based interfaces: dinosaurs or dynamos? You be the judge.

Text is dead. If it's not dead yet, it's going to be dead soon. This is not something I want to happen—I write for a living. Nonetheless, it's a fact, and you can't deny it. The success of radio, television, pocket calculators, and *People* magazine tells us that the death of text is fast approaching. The trend is reflected in the world of computers, just as it's reflected in wordless graphical road signs that use symbols to say "No Parking."

People can no longer read, can't write, can't add or subtract without help. The fact is, they won't need these skills in the world of the future. Somehow they know more and get by because they see more. Television puts them right in the middle of the action. People don't read about things anymore—they experience them in a weird new firsthand way. I'm not saying the trend is good or bad. It's just a trend.

So now we talk about the future of computers. There is no reason to believe that computers will be the last bastion of literacy, is there? Many computer users have long since given up reading as a pursuit. The children coming along today are the worst. Have you recently heard a kid say, "Gee, Mom, I'm bored, I think I'll go read a good book!" That'll be the day. These are tomorrow's computer users, the kids who want to use a mouse and look at pretty pictures on the screen.

While they may be attracted by the simplicity of graphical interfaces, the irony is that other, more experienced users are attracted because of the efficiency of the graphical interface—the power of the image. Text-based systems are rigid, not fluid. They are of the past. They are weak and restrictive. They appeal to fogies and mainframers who wish to return to the cryptic old days when people thought that what mainframers did was important because nobody could figure out what they really did. The priests of computerdom. I thought they were gone until I got into this debate with you, Jim.

Graphics are our only universal form of communication. A program that has a phone for an icon and graphically shows me a call in progress is universal. *(continued on next page)*

PHOTOGRAPHS BY RUVEN AFANADOR

Boy, I sure like little pictures on my computer screens. Icons for programs, icons for files, scroll bars, artsy little dialog boxes, and all the rest of it. And yes, even a picture of a telephone, when I have the patience to use Apple's lethargic communications program for the Macintosh, DeskTop Express.

In fact, that's one reason why I *do* use a Mac some of the time: when I'm working with graphically oriented things, such as desktop publishing projects in PageMaker and presentation graphics in PowerPoint 2.0, a graphical interface is a nice advantage.

But to suggest that graphical interfaces are going to shove character-based interfaces (I think you'll find that's what most of us call what you dismiss as "text" interfaces, John) into the closet anytime soon is balderdash. And you know it.

Because the fact is (Point One) that a heck of a lot of people still use PCs for what we may as well call "production typing": getting letters and reports and stuff like that out the door. And for production typing, graphical interfaces just don't add much value.

In fact (Point Two), graphical interfaces exact a high price in computer power. A graphical interface program like Microsoft Windows is an absolute slug on, say, a standard PC-XT. It's so bad, in fact, that Microsoft (very much to its credit) admits Windows is unacceptable on anything slower than a 286 PC. And unless you're an awfully patient sort, you'd better look into buying a 386 machine, not a 286. A fast one, at that.

Yet (Point Three) the great majority of IBM PCs and PC compatibles in use today are 8088-based PCs. That's slowly changing as 286s and 386s make headway, but the 8088s are hardly dead yet, as Vendex, Tandy, and many other vendors of entry-level machines can tell you. It's going to be a long time before those faster chips and their successors constitute the majority of the installed base of IBM-style PCs.

In other words, for years we'll *(continued on next page)*

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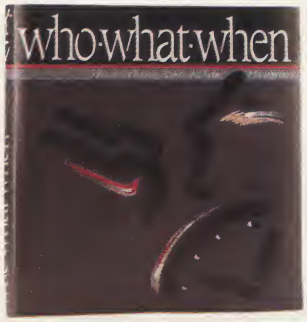

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DVORAK

Anyone can figure out what's happening and how to use the program without translation. Graphics communicate far better than the idiosyncrasies of language on which text-based computers are founded.

I'm amused by the fact that you, Jim, while defending the arcane world of text-based computers, use a Macintosh! (Now it can be told!) How do you rationalize that bit of cheating with your argument that machines with text-based interfaces are cool?

OK, I'll drop it, but let me point out that throughout the history of computing one common trend emerges: the superstar programmers and power users gravitate toward the uncommon machines that soon become the mainstream. If we sat down today with the hot and happening programmers and computer gurus we'd find one thing they all have in common: they all subscribe to the notion that the graphical interface is the future of computing.

Your buddies in those big, dull, mainframe-oriented companies such as IBM, Control Data, and Unisys are the ones who are trying to hold the graphical interface at bay. After all, it's part of a movement away from heavy use of heavy iron—you know, those mighty profitable big machines. If IBM had its way, it'd have a law passed saying that all computing had to be done in batch mode on big machines. To heck with this interactive personal computing nonsense.

It's true that the graphical interface makes no sense in a world of mainframe batch processing, and I suppose, from that perspective, you're right, Jim: text-based is better. But that world is fading fast. —*JCD*

SEYMOUR

still have a majority of machines that will *never* be able to run a graphical interface with anything like acceptable performance. (Unless, of course, you upgrade them with 286 or 386 boards, which is an expensive way to get little pictures on the bottom of your screen.)

How important is this "production typing"—this stuff done in a perfectly acceptable fashion by character-based machines? It represents the overwhelming majority of business word processing today—and will next year, and the year after, and five years from now.

All that helps explain why WordPerfect—a classic character-based-interface product—is the best-selling, most widely used PC word processor in existence (Point Four). Even though WordPerfect 5.0 has some nifty graphical features—by which I mean its ability to enfold graphics into your text—it's still a character-based product.

(And while WordPerfect people acknowledge that today's somewhat graphical WordPerfect Macintosh is a model in the making for an upcoming graphical-interface WordPerfect for the PC, probably running under OS/2's Presentation Manager, those same people promise that the WordPerfect Corporation will keep a high-level character-based product in their line, too. They know how many people are more interested in results than revelations. And they like making money by selling to the great majority of buyers in the market.)

Fact is, I really like graphical interfaces. I'm not very fond of the half-baked, wimped-out, semigraphical interfaces we see on PCs today—Windows and GEM come quickly to mind—but the genre continues to grow and become richer and more interesting.

Steve Jobs's NeXT machine and other new-generation personal computers will surely advance the art of the graphical interface. Hewlett-Packard is pushing to make Windows more truly graphical (as well as more intelligent) with its NewWave Windows shell. So eventually, for some people, and especially for some kinds of work, graphical interfaces will become the standard.

But don't go claiming that only "fogies and mainframers" like character-based interfaces. Try telling that to the tens of millions of people—about 98 percent of the owners of PCs and PC compatibles—who happily compute with character-based interfaces every day, and who don't worry a bit about not getting to point and click at little pictures of folded-over pieces of paper, cutesy lightning bolts, and furry bunny rabbits. —*JS*

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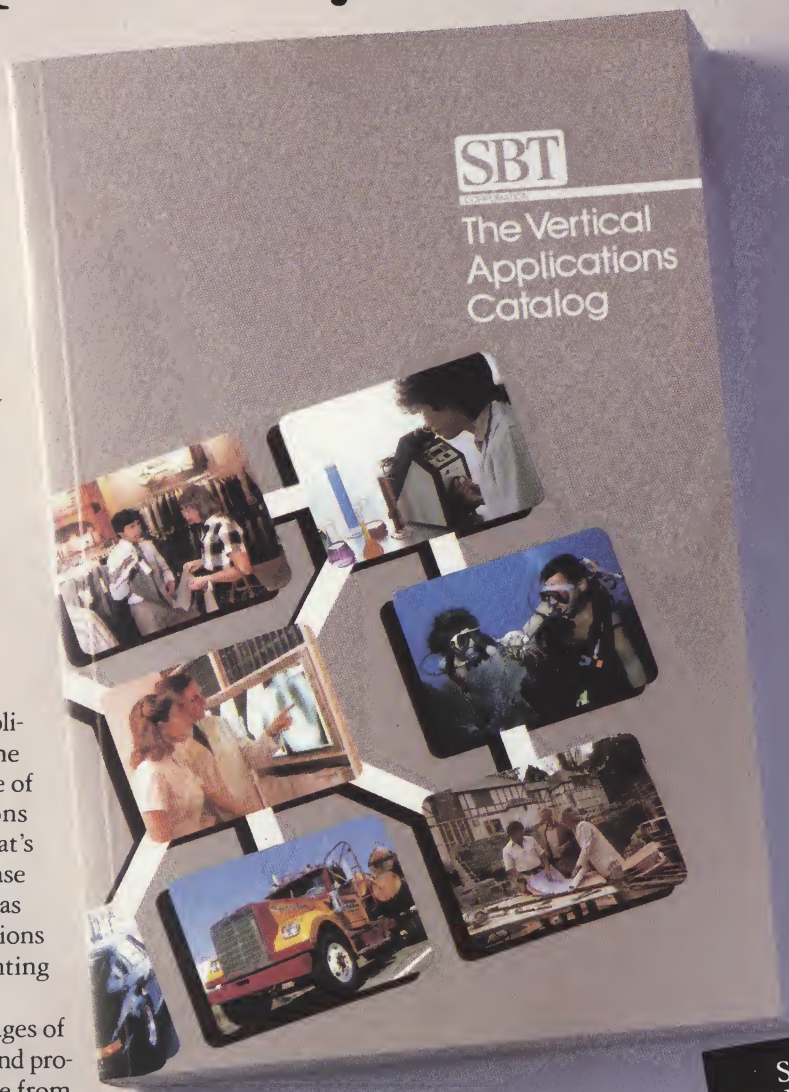

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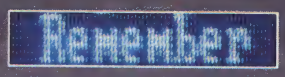

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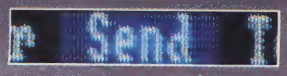

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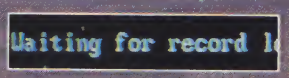

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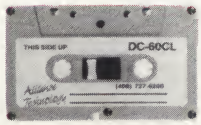

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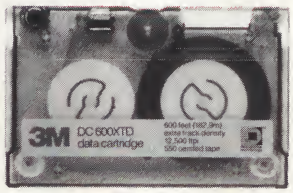

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CIRCLE NO. 194 ON READER SERVICE CARD.

NEW!

Xerox Presents

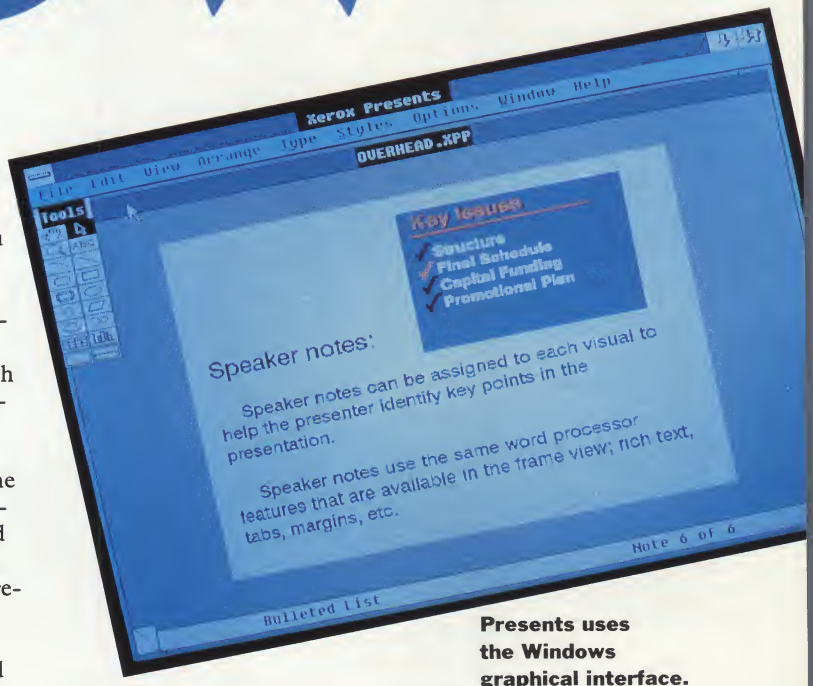
Presentation graphics. Desktop presentations. The difference may seem semantic, but Xerox Presents shows there's more than marketing hype behind the rise of PC desktop presentation software.

Traditional presentation graphics software lets you build charts and graphs for prints, slides, and transparencies. Then you move to your word processor to work up speaker notes and handouts, and maybe even do a little cutting and pasting to merge graphics with those texts.

Desktop presentation software puts the two processes together. In a single package you create visuals, write your notes, and produce handouts replete with graphics, then organize and reorganize your presentation. You not only create visuals—slides, overheads, or disk-based images—you manage them.

Xerox Presents may be the first presentation product for PCs, but it joins a crowded field of Macintosh products, including Microsoft's PowerPoint, Aldus's Persuasion, and Cricket Software's Presents. It's the latter package that the Xerox product emulates. And no wonder: Cricket developed the PC version of Presents for Xerox Desktop Software in San Diego.

Xerox Presents is aimed at professionals who make about a half-dozen presentations each month. Bowing to the idea that these folks are not always PC mavens, the idea behind the package is to make it easy enough to use so that the person giving the presentation can run the program. The package even includes some 200 style sheets to help nonartists produce graphically pleasing and visually effective presentations.



Presents uses the Windows graphical interface.

Add to that a full set of drawing tools, automatic table generation, eight fonts, Bitstream's Fontware font generation program, access to 256 colors, and—for video productions—effects such as wipes and fades. ▶

Inside NEW!

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NEC's SX-y Computers

If you want the power of a 386 PC but are leery of the price, you now have two more ways to ease the financial strain. NEC Information Systems (NECIS), of Boxborough, Massachusetts, has followed the Compaq Computer Corporation's lead by introducing a pair of PCs based on the Intel 80386SX chip.

The 386SX is a lower-cost version of the 386 processor that allows manufacturers to build less expensive computers. Like a full-fledged 386 chip, it processes information in 32-bit chunks but moves data only in 16-bit segments.

The NEC PowerMate SX is a small-footprint desktop computer that comes with 2MB of memory, a 42MB hard drive, and a choice of either a 1.2MB, 5¼-inch or a 1.44MB, 3½-inch floppy drive—all for $4,495. Monitor and graphics board are extra. That ▶

Xerox *continued*

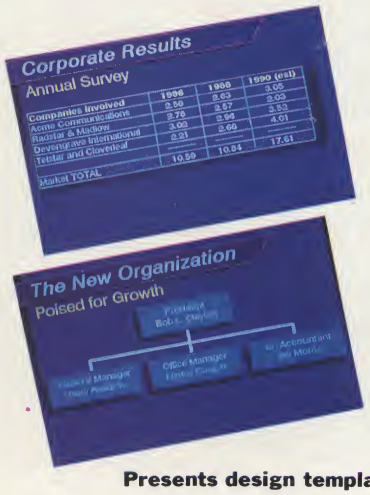
The functionality of the Mac version of Presents is faithfully reproduced in the PC version. It runs under Microsoft Windows 286 and has a similar graphical interface. Use a mouse to guide you through the program's pull-down menus, icons, and dialog boxes.

But despite its Mac parentage, Xerox Presents can't swap files directly with the Mac version. You can, however, move TIFF and encapsulated PostScript files between the two programs. The package will also accept ASCII text files, most spreadsheet data, and graphics files.

All this is priced at $495 before hardware considerations, and in that respect Xerox Presents is no lightweight. You'll need at least a 286 machine with 1MB of memory.

Xerox Presents is only the first of the products to come from the Cricket/Xerox alliance. Expect to see Xerox Graph and Xerox Draw in the future.

—Chris Shipley



Presents design templates help you create consistent visuals.

Rev It Up

At 20 paces, a 386 and a 286 look a lot alike: same square box, same tan color. If you buy power for prestige, what's the point if nobody notices?

Star Industries, in Scottsdale, Arizona, believes your PC ought to speak for itself. Its Hotrod 386 is a case in point. At 25MHz, this machine is as fast as they come, and it's guaranteed to get noticed. Looking a little like something out of *American Graffiti,* the chassis is custom painted black with orange and red flames. (If you want to tone it down, you can choose from five other colors, including "marvelous mauve" and plain IBM beige.)

The Hotrod 386 comes with VGA-compatible graphics and monitor, a 90MB hard disk, 2MB of memory, 1.2MB and 1.4MB floppy drives, serial, parallel, and game ports, and a mouse. All for $9,995, about the middle of the 25MHz 386 price range.

Star also says it plans to deck out the Star 26/28 386, its newest system, with speed "unequaled in the industry."

—Chris Shipley

SX-y PCs *continued*

price tag puts the PowerMate on a par with Compaq's $5,199 Deskpro 386/S, which has a built-in VGA graphics controller but only 1MB of memory (1MB of expansion memory for the Deskpro 386/S costs $799); models with less storage sell for as little as $3,799.

Otherwise, the PowerMate and the 386/S are fairly close by most measures, with a similar range of options and essentially equivalent performance.

Where NECIS stakes out some new ground is with its second SX offering, the NEC PowerMate Portable SX. For a base price of $6,595, you get a 21-pound, lunchbox-style portable that shares some standard features with its deskbound sibling: 2MB of memory, a 42MB hard drive, and the same software bundle.

The PowerMate Portable SX doesn't quite have the raw processing power of the 20MHz Compaq Portable 386, which it resembles, but it does have some things the Compaq portable doesn't. By comparison, the NEC portable has a much lower price than the Compaq's $7,999, an extra megabyte of standard memory, three built-in full-size expansion slots (Compaq's portable has none built in, but you can buy an expansion box that attaches to the machine), and a VGA-compatible plasma display that supports 16 shades of gray.

Considering the innovation and value built into its products, we all may need to pay some serious attention to NECIS. It was 37th in the race to bring an AT compatible to market, but it's finished a strong second with an SX-based laptop, and it's number one with an SX portable. *—Jon Pepper*

386SX power in two packages.

The Laps of Luxury

NEC Home Electronics has proven that the laptop market can get a little bigger while at the same time getting smaller. The Wood Dale, Illinois–based company's new UltraLite is the smallest, thinnest PC-compatible laptop yet.

Weighing in at a scant 4 pounds, the sleek-looking black computer is only slightly larger than a legal pad and only 1.4 inches thick. But packed into this tiny package is an 8086-compatible NEC V-30 processor, 640KB of memory, a 2,400-bps modem, a CGA-compatible backlit LCD, and an 82-key keyboard.

The UltraLite, however, doesn't have a conventional disk drive. Instead, a slot accepts ROM-based software cards. Popular programs such as Lotus 1-2-3, WordPerfect 5.0, XyWrite II, Crosstalk, and Microsoft Works will be available from NEC. DOS 3.3, Microsoft DOS Manager, and LapLink are already built into ROM.

Storage is available in a standard 1MB or optional 2MB silicon hard disk, with a RAM access time of a mere .1 millisecond, and NEC is working on an 8MB silicon disk. Instead of a floppy drive, you use the ROM-based software and store data to the battery-backed silicon hard disk, then put either LapLink or the modem to work for data exchange. However, NEC does offer an optional, lightweight portable floppy drive for $399 that also provides a parallel port. The laptop will run off either AC power or batteries, with battery life estimated at two to three hours; the floppy drive runs on AC power only.

At $2,999 (or $3,699 for the 2MB version), the elegant UltraLite could easily turn up on the wish lists of executives, mobile professionals, and, of course, journalists.

For those who want all of the above and more, NEC has the ProSpeed 386, a high-powered laptop that uses the docking-station concept. The docking station, which has four full-sized expansion slots and two disk drive bays, remains on your desk and provides true desktop computer functionality. The laptop unit plugs in or out with one touch and eliminates the wires and hookups that laptop expansion boxes usually require.

To make life easier, the laptop has two Config.sys files, one for laptop use and one for the configuration when docked. The system automatically senses which one should be invoked.

Without the docking station, the ProSpeed 386 is a full-function 18-pound 386 laptop with 2MB of memory, a 16MHz 386 processor, and either a 40MB or a 100MB hard drive. An optional 3-pound battery, at $299, gives you cordless operation for two to three hours.

The ProSpeed's 11-inch diagonal black-on-white display is striking. Using fluorescent backlighting, it provides 640-by-400-pixel resolution and supports EGA and double-scanned CGA graphics. It will also send VGA-compatible images to an external monitor.

The suggested retail price of the ProSpeed with the 40MB drive is expected to be $7,699, which puts it in the rarefied price atmosphere of the Toshiba T5100 and the Zenith TurbosPort 386. However, the docking station adds another $1,199, pushing the combination well over $8,000.

NEC is not the first to try the docking-station concept. Alloy Computer Products, of Framingham, Massachusetts, sold a docking station called StarBase for the ill-fated IBM Convertible but discontinued the product for lack of demand. Will NEC's docking station fare better? Odds are that it will. —*Jon Pepper*

The NEC ProSpeed 386.

The 4-pound NEC UltraLite.

Compaq's newest 386: the Deskpro 386/20e.

Compaq Sorts Out Its 386s

No more fooling around for Compaq in the 386 market. By discontinuing the Deskpro 386/16, Compaq's 16MHz system, and replacing the Deskpro 386/20, the Houston-based company is offering a full range of 386-based PCs without overlap or redundancy, says product marketing director Lorie Strong.

The new 386/20e has many of the features of the 386/20 it replaces, including a 20MHz processor, 1MB of memory, a cache memory controller, and an optional Intel or Weitek math coprocessor. But the 386/20e also offers built-in VGA-compatible graphics and serial, parallel, and mouse ports. The /20e has only four expansion slots—the now-defunct /20 gave you six—but, like its predecessor, it includes a high-speed memory card slot that can be used to bring the system's total memory to 16MB.

The /20e comes in three models: the Model 1, which is priced at or below $5,299 and offers one 5¼-inch, 1.2MB floppy drive; the Model 40, priced at or below $6,599 with the same floppy drive and a 40MB hard drive; and the Model 110, priced at or below $7,999 with a 110MB hard drive.

This new machine sits in the middle of Compaq's three-product 386 line. The top-of-the-line Deskpro 386/25 offers the greatest expansion potential both in add-in cards and in storage devices. "People who need the ultimate in performance have gone to the 386/25 because they need the slots and they need the full-height drives," says Richard Swingle, Compaq's director of new product marketing. Compaq has also added a 60MB model to the 386/25 family, which includes PCs priced from about $8,000 to $13,299.

At the low end, Compaq offers the Deskpro 386/S, which ranges in price from $3,799 to $5,199. The 386/S is based on Intel's 80386-SX chip, a less expensive and slower version of the 80386. (The 386SX is a 32-bit chip with 16-bit I/O.) Strong calls the 386/S a "stretch machine," a product that lures 286-based PC shoppers with its higher performance and, relative to the 386 market overall, its lower price.

The 386/20e—like the discontinued 386/16—is a general-purpose 386 machine, aimed at those moving up from 286 technology. This positioning, along with the price and performance of both the 386/S and the /20, "squeezed out" the /16 and led to its demise, says Strong.

—Chris Shipley

Online Lockup

The age of customized networks is upon us, and the latest addition is ACAnet, a network of the American Correctional Association in College Park, Maryland. Why do these guys need a network? To discuss the old days at Alcatraz? To foil escapes from Sing Sing?

Not quite. More mundane business is transacted on this Delphi-based network: bringing jail wardens, guards, and companies offering correctional products together to talk shop. After all, when you're stuck in a facility surrounded by Louisiana swampland, it's hard to keep in touch with other corrections officers.

Through electronic mail and online forums, ACAnet offers that access, as well as a database of articles, prison reports, public domain software, and even an opinion poll on corrections issues.

ACAnet has everything the other networks have. A news feature keeps officers up to date on current correctional happenings and ACA conference dates. Forum topics include such issues as prisoner employment and jail overcrowding.

The shopping service lists companies that stock correctional goodies. From AIDS testing to X-ray screening, ACAnet is full of essentials for the discipline-minded shopper. Some favorites: narcotic identification products and the SCAN Transmitter, which can pinpoint officers within a building.

For laypersons, ACAnet is a fascinating one-time online thrill. But, as one ACA staffer says, "We don't expect many people not in the field to be interested in ACAnet."

—Christopher Johnston

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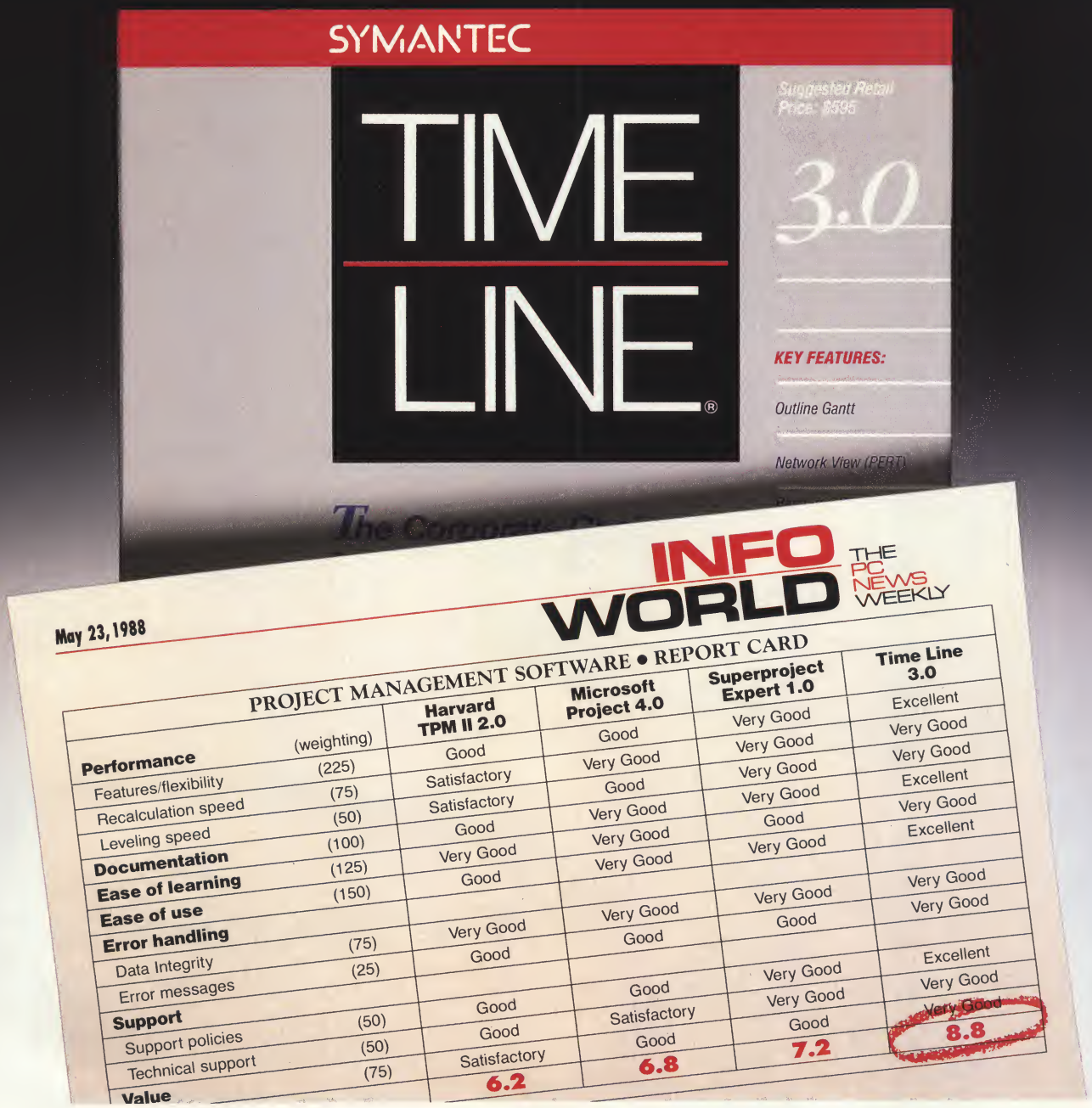

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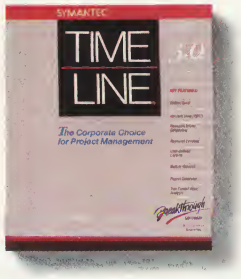

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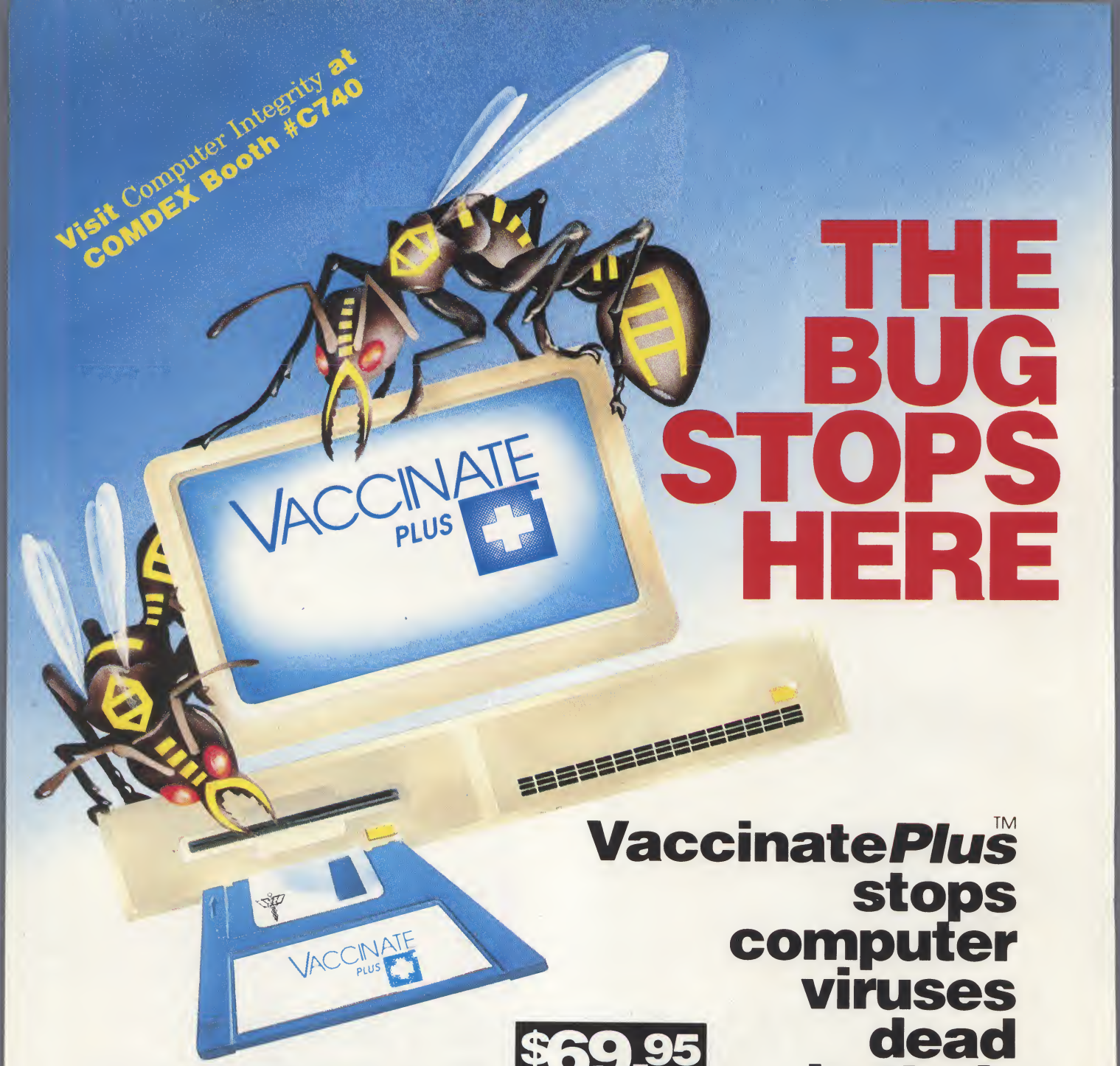

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Scan This Story, and the Pictures, Too

What do you call a software product that has the potential to do for scanner sales what Lotus 1-2-3 did for personal computers? Some are calling it a radical breakthrough and others a new category of software, but most are just calling it OmniPage.

OmniPage, developed by the Caere Corporation of Los Gatos, California, gives a desktop scanner the ability to recognize virtually any document it is fed, regardless of the mix of images and text on the page. A user can scan a newspaper or magazine article and store the text as a text file and the image as a Tag Image File Format (TIFF) file. These files can then be edited, searched, deleted, or copied and pasted into 16 popular word processing file formats, including WordPerfect, WordStar, Microsoft Word, and ASCII files. You can also scan a list of names and addresses, edit the list, and merge it into a 1-2-3 or Excel spreadsheet or a dBASE database.

Currently, OmniPage includes drivers for the AppleScanner, Hewlett-Packard's ScanJet, and Canon's IX-12 scanner. These drivers allow the scanner to recognize text and images in a single pass. OmniPage also recognizes pages stored in the TIFF format, which is used by many other scanners, including those from Datacopy, Dest, and Microtek. The company says it has been contacted by every major scanner manufacturer about including drivers for their scanners in later versions.

The version of OmniPage for XTs, ATs, and compatibles, which includes an add-in board with 2MB of memory and a Motorola 68020 microprocessor, sells for $2,495, and most desktop scanners sell for under $2,000. The combined $4,500 price tag may seem a bit steep, but considering that similarly capable systems, like those from Kurzweil and Palantir, cost anywhere from $10,000 to $40,000, it's not a bad deal at all. —*Kenan Woods*

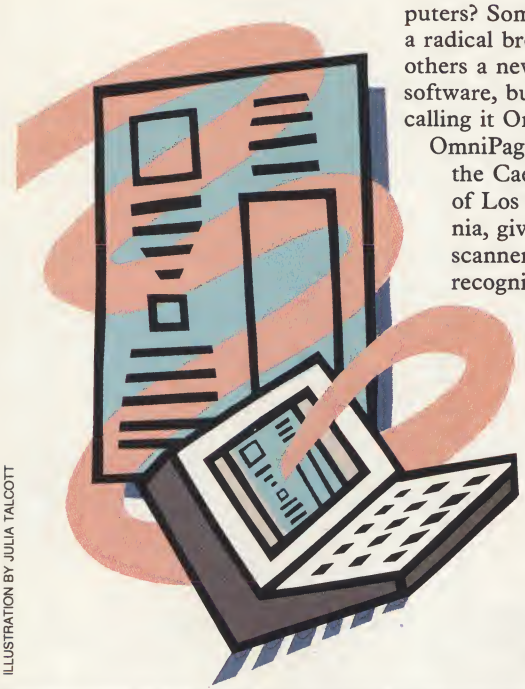


ILLUSTRATION BY JULIA TALCOTT

Some Fax About MCI Mail

MCI is offering 4.2 million more reasons to use MCI Mail: the service can now send messages to any Group 3 facsimile machine around the world.

The addition of fax transmission "was a logical progression" of MCI Mail, says spokesperson Jane Levene. Customers won't need any additional hardware or software to use the new service. All you need is the receiver's fax number. MCI automatically generates a cover page, as well as confirmation and cancellation notices. A flexible retry time lets the service redial a number as often and for as long as you wish.

MCI, of Rye Brook, New York, chose to deliver messages solely to Group 3 machines because market research has indicated that these systems are more reliable, easier to use, and more common than Group 1 and 2 machines.

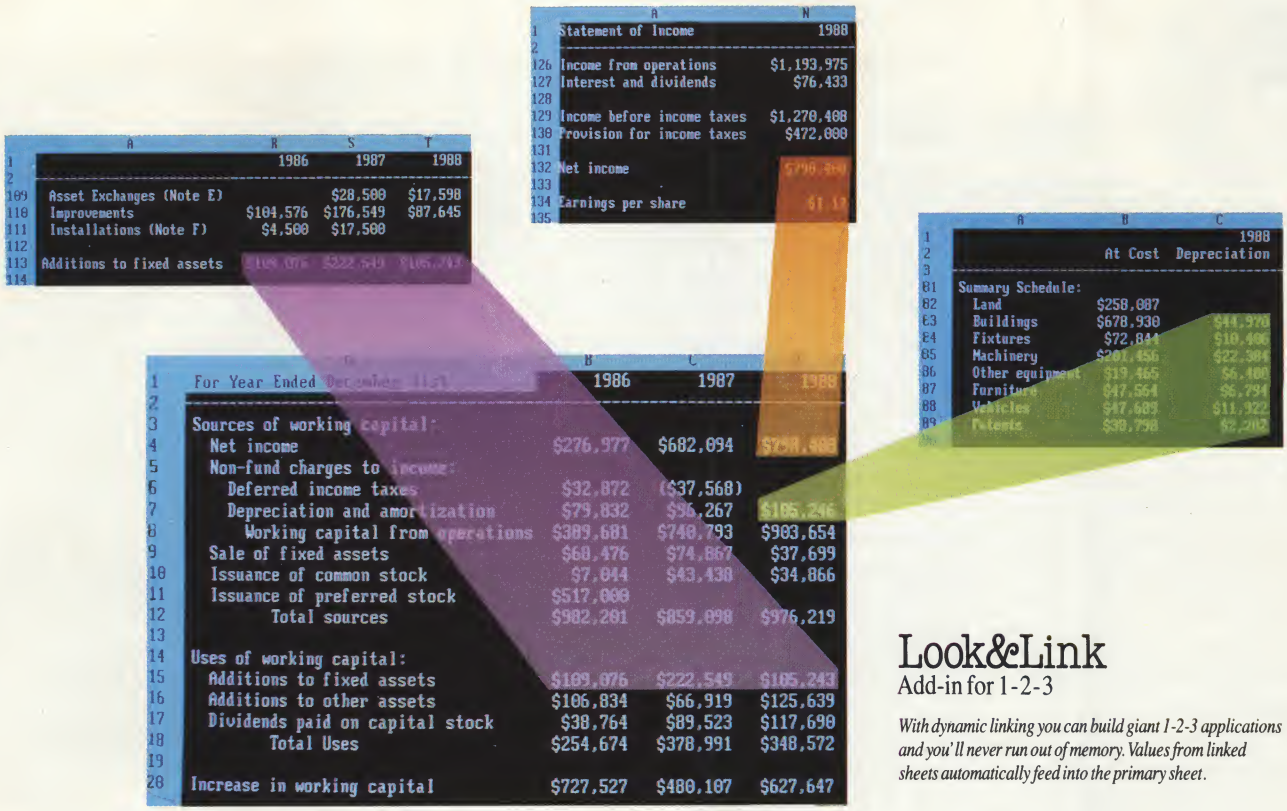
Users will be charged on a half-page basis, Levene says, but at press time a final price was not set. As the system stands now, the MCI-to-fax service is limited to text files, but the company is working on integrating the service with MCI Mail's graphics capabilities.

Even-Steven

Thinking about trading in that old IBM PC AT for a new PS/2? If so, you might want to contact Micro 1 first. The San Francisco–based company will trade you a new 16MHz, 286 computer with a 30MB hard drive, a 1.2MB floppy drive, a Key Tronic 101 enhanced keyboard, and an amber monitor for that old AT. No kidding, an even swap.

Why are they doing it? Money, of course. The aftermarket for IBM ATs is quite brisk. Computer brokers are buying up ATs to sell to IBM customers who are looking for new PCs but are wary about buying PS/2s. "Just the fact that we are able to offer this deal shows how much margin there is in it," remarks Micro 1 president Richard McCabe.

But McCabe says his company, which specializes in customized computer systems, is also hoping to attract attention—"without spending $40,000 a month on ads"—and win some customers. The new machine comes with as much memory as the traded AT, a motherboard with a 4MB capacity, OS/2 compatibility, and a one-year warranty, McCabe says. The offer will last as long as there is a market for ATs. There is one catch, though: the AT has to be in working order. —*Kenan Woods*



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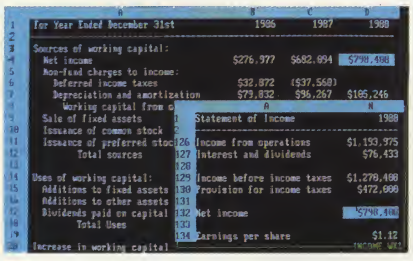

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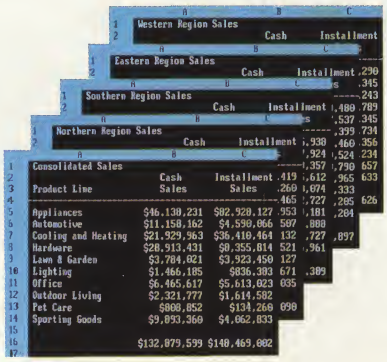

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The Shadow Hawk Knows

The end began for Shadow Hawk on June 6, 1987, when an AT&T security official logged onto a Texas bulletin board called Phreak Class-2600 and found messages from a hacker boasting that he'd penetrated the company's computer system.

By the time the Hawk had been forced from the shadows, the FBI, the Secret Service, the Defense Criminal Investigative Service, and the Chicago U.S. attorney had joined the chase. An 18-year-old high school dropout was arrested for, among other things, unlawfully invading computers belonging to NATO, Bell Labs, and the U.S. Air Force and plucking from them 52 AT&T proprietary software systems worth $1.18 million.

"He was," says William Cook, assistant U.S. attorney in Chicago, "on the verge of being able to manipulate or halt the telephone system."

Although Shadow Hawk, a.k.a. Herbert Zinn of Chicago, isn't talking to reporters, one AT&T spokesman referred to his alleged actions as "yuppie vandalism." Far from trying to sell the pirated software, young Zinn seems to have been motivated by nothing more than a desire for some heady armchair adventure. He was reckless enough to have listed AT&T computer phone numbers and passwords on a Chicago computer network, and once caught, he reportedly cooperated with investigators.

Anton Valukas, the Chicago U.S. attorney, however, seems determined to make an example out of the hapless Zinn, who, if convicted under the federal Computer Fraud and Abuse Law of 1986, could be jailed until he turns 21. "The only way to convince these people that this is not a game, not Pac Man," Valukas said before the judge clamped a gag order on the case in August, "is to prosecute them."

As for AT&T, the company assures the public that any security problem it might have lies not with its computerized telephone system but with the people who run it. "We're saying the locks are pretty damn good," AT&T's Burke Stinson told reporters late last year, "but we need to remind people to close the door." In one of the lighter ironies of this strange case, Shadow Hawk stored the pirated AT&T software on a 62MB Unix PC—made, of course, by AT&T.

—Norman Boucher

Electronic House Calls

Dr. Robert Friedman, an associate professor of medicine at Boston University, is taking a novel approach to health care. He's using TLC. Telephone-Linked Computer, that is.

TLC is a talking computer that keeps tabs on 40 Boston-area patients with high blood pressure. The patients, each outfitted with a home blood pressure kit, call the computer once a week and answer questions about their blood pressure, medication, and health by pressing keys on their Touch-Tone phones. The system then "comments" on the patient's progress. A patient who reports a high blood pressure reading and admits to not taking his or her medication is gently scolded by TLC. "Your blood pressure isn't so good today. If you took your medication, maybe it would be lower," the computer chides. Conversely, TLC expresses satisfaction and support to patients whose readings have improved.

If, during the course of the conversation, TLC detects a condition that requires immediate attention—extremely high readings or dangerous side effects—the computer notifies the doctor, who in turn contacts the patient. Otherwise, the results of the conversations are transmitted to the doctor in a report not unlike those from lab tests.

The system consists of a PC, a speech synthesizer from Digital called DECTalkm, and software developed by Dr. Friedman. With total hardware costs in the $15,000 range, the system could become a cost-effective way to improve health care.

Most patients with hypertension, for example, see a doctor only every three or four months, and problems that arise between visits go undetected. TLC, however, lets the doctor check on his patients on a weekly basis, "and that's a lot more often than I could see them," Dr. Friedman says.

Dr. Friedman plans to expand the hypertension program to 500 patients next year, and he hopes to introduce similar systems to monitor patients with other chronic illnesses such as diabetes and arthritis and even emotional problems such as loneliness.

—Kenan Woods

ILLUSTRATION BY JULIA TALCOTT

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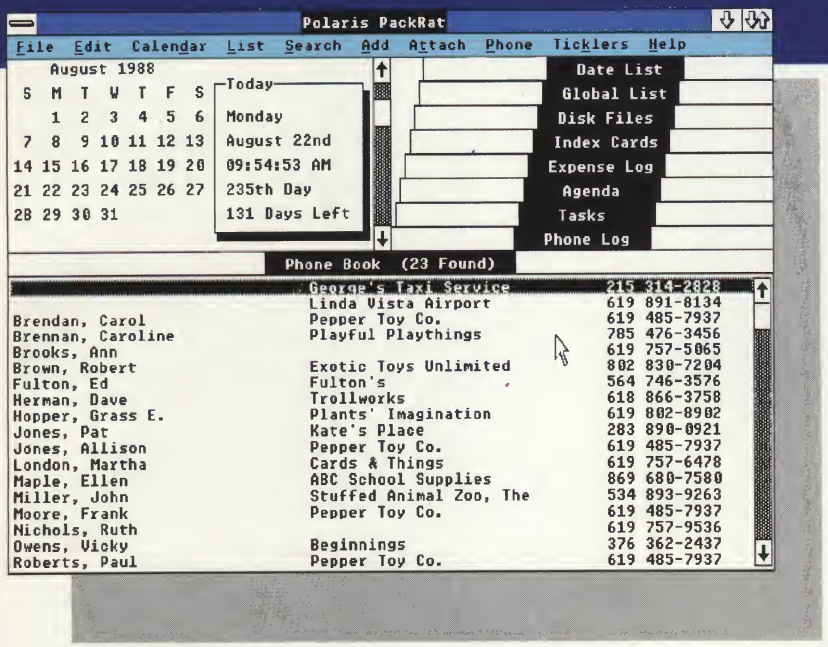

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CIRCLE NO. 169 ON READER SERVICE CARD.

NEOGEO

Plain-Paper Color for Under $2,000

A plain-paper color ink jet printer wasn't good enough for Sharp Electronics. The company has topped its JX-720 with a new model that's twice as fast.

The JX-730 turns out one page per minute with a resolution of 180 dots per inch. The output speed varies depending on the complexity of the graphic image, but average times are about 2½ minutes per 8½-by-11-inch page. The B-size printer, with a 19KB image buffer, can handle paper sizes up to 11 by 17 inches and will print on uncoated paper.

Many ink jet printers house ink reservoirs in groups of two colors. When one color runs out, both colors have to be replaced. But the JX-730's four ink reservoirs are separate, allowing each color to be replaced individually, which keeps usage costs down.

Sharp officials see a large market for the printer in small businesses and graphics shops that do complicated desktop publishing or want color graphs and charts to liven up presentations and reports. The company, located in Mahwah, New Jersey, expects to ship the unit around Thanksgiving and has tentatively set the price tag at $1,995.

—*Kenan Woods*

Fast and colorful, the Sharp JX-730 ink jet printer.

Door-to-Door Laptops

ILLUSTRATION BY JULIA TALCOTT

It's the age, Martin Baum says. You can't always trust 'em on the age.

Baum is a special assistant to the director of the Hyattsville, Maryland–based National Center for Health Statistics (NCHS), which is responsible for the federal government's year-round, door-to-door surveying of Americans' knowledge and attitudes regarding things medical. And he's noticed something: Ask Mrs. Smith when she was born, and she'll say, "1939." Ask her how old she is, and she's liable to say, "46."

Some of the government's more mathematically nimble interviewers catch such discrepancies and gently probe for the truth. More often, it passes undetected—until weeks later, when it causes some data analyst at headquarters to shake his head and reach for a few Extra-Strength Tylenol.

Enter the laptop. The NCHS, through its parent agency, the Center for Disease Control, recently laid out $600,000 to purchase 260 of the small wonders from the Mountain View, California–based GRiD Systems Corporation, and it has already begun issuing them to field interviewers for use in its current survey of AIDS understanding and attitudes among more than 50,000 U.S. households. It's the largest and most ambitious government survey project yet to replace pencils with pixels.

One reason for the electronic upgrade, Baum says, is the lure of instant online editing. Now, when Mrs. Smith follows "1939" with "46," the computer nudges the interviewer with a silent "no way." The problem can be ironed out on the spot.

Baum says the move to computers will also produce more reliable data, because the customized software (developed in-house) is designed to guide interviewers effortlessly through a survey whose hundreds of questions and complex "skip patterns" tended to cause errors in the pencil-and-paper past. And field use of laptops drastically reduces the time it takes to turn raw data into published statistics. Instead of laboriously keying in handwritten survey results, the agency now simply uploads the data, collected on 3½-inch floppies, to its mainframe.

So far, Baum says, most NCHS interviewers have responded positively to computerization. The 9.7-pound GRiDLite Plus is filling the bill for portability, screen visibility, and battery life. And there's been no objection from interviewees, either. "Within the next two to three years," Baum asserts confidently, "all our household interviews will be done by laptop."

Keep that in mind the next time a government survey-taker asks for your age.

—*David Rubin*

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CIRCLE NO. 256 ON READER SERVICE CARD.

A Communications Gold Mine

Most early PC asynchronous terminal emulation programs offered pretty much the same set of basic features. They let your PC emulate a terminal, and many also let you transfer files between your PC and the host. That was about it.

Not so anymore. Today's most powerful products, such as Relay Communications' Relay Gold 3.0, go way beyond these early offerings. Yes, you can use Relay Gold to emulate a variety of DEC and IBM terminals, and you can transfer files using a number of popular protocols.

These capabilities, however, are just a sample of Relay Gold's power.

Want to communicate with an IBM mainframe? You can run Relay Gold with a 3270 emulation card. Relay Communications, based in Danbury, Connecticut, also offers several sister mainframe packages that let you connect to a mainframe asynchronously.

Tired of typing in the same old communications commands? You can automate almost any communications task with Relay Gold's script language. This enormous, powerful language contains over 150 commands, 43 functions, and 112 system variables.

Like to keep your communications program accessible? Run Relay Gold as a terminate-and-stay-resident (TSR) program and bring it up when you need it. It can even work in the background.

The list of features goes on and on. Relay Gold is a very powerful product that justifies its $295 price. The cost of this power is that Relay Gold can be daunting. Its user interface and documentation are reasonable, but with this many features there is a lot to learn.

If you're a novice communications user, or if all you want is a basic package, this product is overkill. But if you want more than a terminal emulator and need the power and features to meet almost any communications requirement, you definitely should consider Relay Gold. —*Mark L. Van Name and Bill Catchings*

As Good as New

You've dragged it through countless airports and bumped and banged it in your travels about the globe. Now you can restore a youthful luster to that scratched and foggy laptop screen.

Ultrasoft Innovations has developed the Ultralucent and Ultralucent EL laptop-screen home repair kits. The kits include everything you need to polish away dings and scratches to make your laptop display good as new.

Ultralucent, for hard plastic–covered displays, includes a set of color-coded sandpaper-like abrasive sheets, a foam sanding block, antistatic cream and applicator, and comprehensive instructions that help you assess the damage, then walk you through the rejuvenation process.

For soft plastic displays, use Ultralucent EL, a liquid containing a mild abrasive that gently polishes the plastic.

Don't worry about wearing away your laptop's plastic screen, says company spokesman Richard Eckerlin. "There is no danger of wearing the plastic down unless you use Ultralucent every day for two years," he says.

Ultrasoft recommends using Ultralucent once a year when scratches are present. Even on soft screens, the liquid abrasive can be used monthly without wearing down the plastic.

The kits are available directly from Ultrasoft Innovations, in Champlain, New York. The Ultralucent kit costs $19.95, and Ultralucent EL is $14.95.

—*Jane Hallisey*

A Worthy Cause

Making the sale is hard work, but it's even tougher to get users to register the products. Typically, only a small fraction of software buyers do so.

Relay Communications is appealing to users' sense of philanthropy to get them to register purchases of Relay Gold 3.0. The company will donate $1 to the Muscular Dystrophy Association for each product registration card it receives.

PHOTOILLUSTRATION BY CANDACE KUSS

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Once up and running, bingo, you have instant access to five key business functions: spreadsheet, word processing, database, graphics and communications. So you can prepare budgets, write memos, create inventory lists without having to go through the hassle of changing programs.

But Symphony is really more than five separate programs. Because, unlike other integrated packages, Symphony lets you dynamically integrate functions. For example, when you change spreadsheet data, your graph of that data and your memo containing the same numbers automatically reflect the changes. So you get greater efficiency, and you're able to work faster too.

Plus, the Symphony spreadsheet is the fastest and most powerful spreadsheet available in integrated software, based on Lotus® 1-2-3®, the industry-standard spreadsheet technology.

We could go on about the many features of Symphony 2.0—how its macros let you automate complex or repetitive tasks and create customized applications. How the word processor now has a spelling checker and text outliner. And how database and communications have been improved.

The bottom line is that Symphony is one high performance package that's made to be opened up.

Lotus Symphony 2.0

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Ed Esber Goes Down Under

Step aside, Paul Hogan. Here comes Ed Esber.

Ashton-Tate's chairman and CEO, along with vice president of marketing Lydia Dobyns (far left) and president Luther Nussbaum (second from right), recently waded through a swamp at the Australia Region of the Los Angeles State and County Arboretum while posing for the cover of *Softsel Reseller*, a monthly magazine published by Softsel Computer Products in Inglewood, California.

The spoof of *Crocodile Dundee*, shot by mustachioed photographer Ed Zak, promotes Softsel's Frequent Buyer Holiday promotion to Australia. Banana Republic's director of studio services, Louisa Boisine, looks on.

The premiere issue of *Softsel Reseller* features cover guys Ed Esber and Luther Nussbaum.

Medicare or Big Brother?

President Reagan's catastrophic-health-care bill, which Congress passed last summer, includes a drug benefit program for Medicare patients. Among other things, the bill places an annual cap on a patient's drug expenses; Medicare picks up part of the tab once drug costs reach $600.

Just how does Medicare propose to monitor its 32 million patients? With a computer system, of course.

At this writing, Medicare had yet to finalize plans for the program, according to spokesman Robert Hardy, but it is thinking of using some sort of credit card application. A pharmacy would have a small credit card reader connected to a Medicare database. The pharmacist would run the patient's card through the machine, and the database would return information on that patient.

If the records showed expenditures over $600, the patient would receive the prescription at no cost, and the pharmacist would be paid directly from Medicare.

The idea seems straightforward enough, but already—more than two years before its target date—it has stirred a controversy over the accessibility of its information.

Hardy contends that worries over patient confidentiality are "not worth being concerned about" and points to the oath of confidentiality taken by pharmacists.

But one veteran pharmacist believes a system such as the one proposed by Medicare could be accessed by anyone. Although pharmacists take an oath, he notes, clerks don't.

Hardy dismisses the argument and says Medicare will not design the system to address what they believe to be a security nonissue. Patients who wish to keep the nature of their illnesses private may feel otherwise. —*Jane Hallisey*

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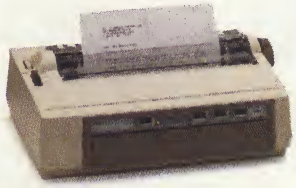

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Byte Size—Right Size?

Computer software doesn't have to be expensive to be of value. Nor does it need to come in fancy packaging, carry a catchy name, or be accompanied by a glossy manual.

Byte Size programs, from Publishing International in Sunnyvale, California, are a case in point. The newest packages have simple names such as General Ledger, Labeler, and Index Cards. The "manuals" are simple documentation files on the disks. Sure, these programs don't compete with big-league (and big-dollar) packages such as Lotus 1-2-3, but they do provide simple functionality without heavy dollar risk.

General Ledger is a simple double-entry, cash or accrual accounting program for business. It lets you set up a basic chart of accounts and make entries into journals. You can print account detail and summary reports as well as a balance sheet and income statement. General Ledger isn't high-powered accounting software, but its educational value alone is worth the $24.95 price.

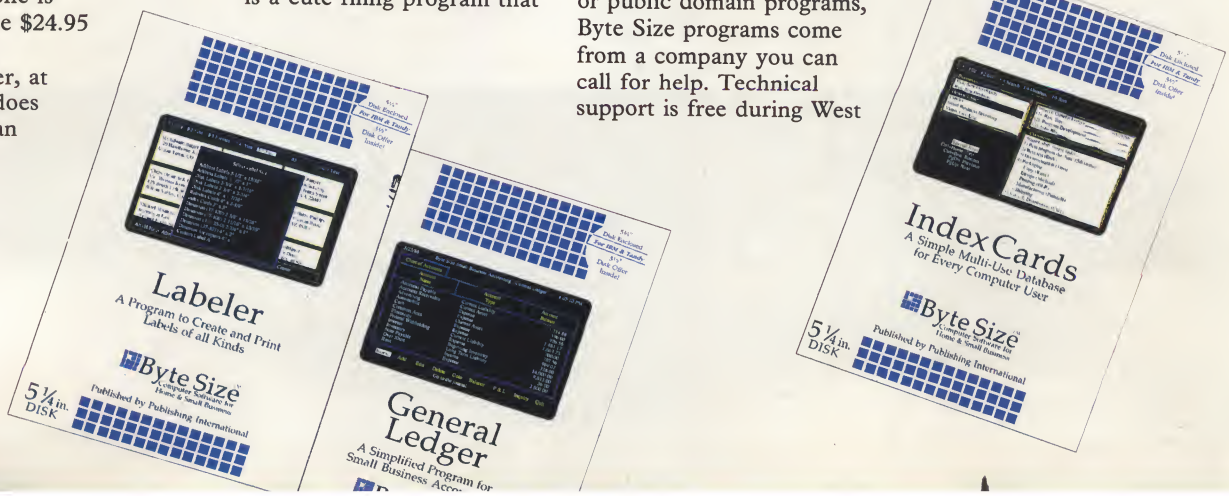
Labeler, at $21.95, does more than simply produce mailing labels in various sizes and formats. The program, liberally laced with help screens, also prints Rolodex cards, index cards, and continuous-form envelopes. The shipped version (we looked at beta code) includes sample labels and an order form for blank labels.

Index Cards, also $21.95, is a cute filing program that uses the onscreen equivalent of index cards to save and sort information. Program functions are accessible through pull-down menus, and you can sort in six ways and search by any series of characters. Index Cards is no dBASE III, but it's enough for folks with very simple filing needs.

Unlike many shareware or public domain programs, Byte Size programs come from a company you can call for help. Technical support is free during West Coast business hours, but there is no toll-free number.

Byte Size programs are a reasonable alternative to more expensive packages. And even if you outgrow them in time, you won't have spent a lot for a pleasant introduction to certain software applications.

—Bruce Brown



Lukewarm Reception

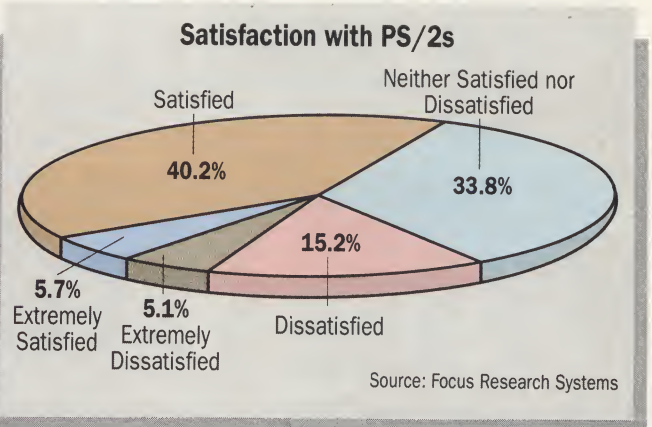
Fortune 1000 companies are planning to invest in the PS/2 in a big way, even though the machine has elicited little more than a giant yawn from those Fortune sites with PS/2s already in place.

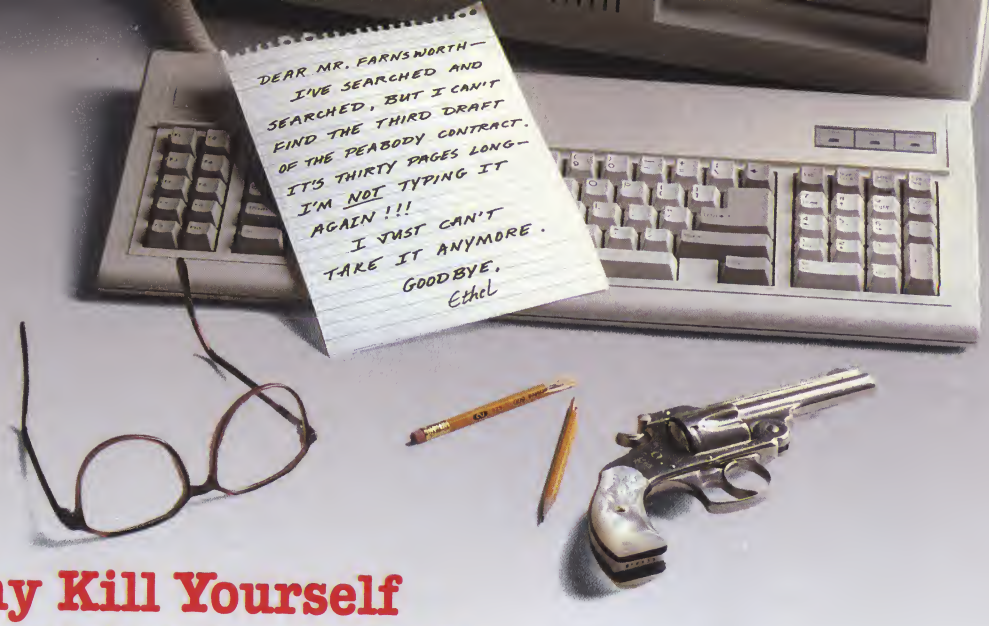
According to data gathered by Computer Intelligence, a La Jolla, California–based market research firm, 72 percent of all PCs installed in Fortune 1000 companies are IBM models, with the PS/2 accounting for only 7 percent of that figure, trailing far behind the PC at 32 percent, the XT at 30, and the AT at 24, with other IBM systems at 7. But 76 percent of the Fortune 1000 plan on installing PS/2 machines, leaving the PC, XT, AT, and others in the dust with a combined percentage of 24.

The PS/2 may be in demand not for its winning personality but for its name. "The Fortune 1000 traditionally stays with IBM," says industry analyst Tom Young, who points out that IBM gets 69 percent of the Fortune 1000's PC dollars.

When it comes to judging the PS/2 on its performance, PC managers are neither horribly disappointed nor giggling with delight. At least that's the finding of the Micro Purchasing Trends Survey from Focus Research Systems of West Hartford, Connecticut. The PS/2 got a "pretty lukewarm reception," according to Focus marketing manager Scott Brown, with 74 percent saying either that they were satisfied or that they were neither satisfied nor dissatisfied with the PS/2's overall performance.

—Susan Jelcich





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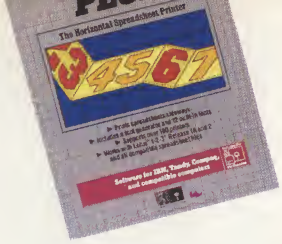
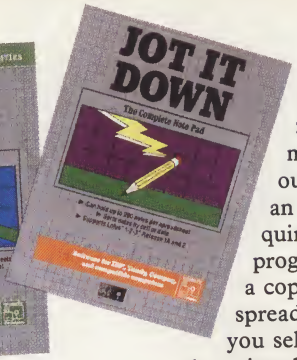




Tools of the Trade

Just as the owner of a high-performance automobile maintains a set of tools to fine-tune his investment, so does the business micro user. A quintet of spreadsheet utilities from New York–based Simon & Schuster Software provides just such a toolbox for the spreadsheet user, allowing the discriminating buyer to choose the tools he needs.

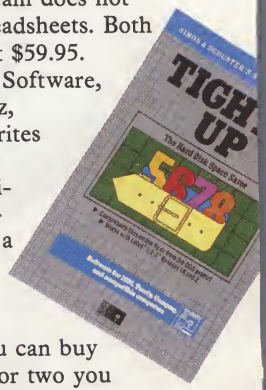
Jot It Down is a memory-resident notepad that works with both Lotus 1-2-3 and Symphony. Notes appear in the middle of the screen and can be edited, copied, moved, and attached to a cell, file, or directory. You can search notes for key words or print them to a file for further editing.

A file squeezer, Tight'n Up, can be operated as a standalone program or as a memory-resident one within 1-2-3. It works with 1-2-3 and Symphony and lets you compress a file by about 50 to 80 percent.

Simon & Schuster's sideways printing utility, Horizontal Plus, must be run outside 1-2-3, an awkward requirement. The program brings up a copy of your spreadsheet and lets you select the range to be printed. Several fonts are available, but the naming convention leaves you guessing about how they will look until you actually print.

At $49.95 each, Jot It Down, Horizontal Plus, and Tight'n Up compete on both price and performance with Funk Software (Sideways and Noteworthy) and Symantec (SQZ! Plus and Note-It Plus) products.

Check It Out is a spreadsheet comparer, and Rescue Me is a spreadsheet repairer. The ability to compare two versions of the same sheet is a nice extra for someone who runs a lot of "what-if" models. Rescue Me is for those who cannot tolerate an isolated occurrence of a bad data write or physical damage to the disk, but the program does not undelete spreadsheets. Both packages cost $59.95.



Consumer Software, of Santa Cruz, California, writes the Simon & Schuster utilities and markets them in a package called Spreadsheet Toolbox. You can buy just the one or two you need from Simon & Schuster, which offers up to a $30 rebate on combination purchases, or buy the whole lot from Consumer Software for $99.95. In either case the tools are identical, and you get the same advantage of a consistent user interface. If you have the right problems, these utilities provide the solutions.

—Mike Burgard

Smaller Disks, Higher Prices

You can fit a couple of them in your pocket, or drop them in an envelope to mail across the country. The compact, durable 3½-inch diskette has been around since the early 1980s, and Macintosh users have touted its advantages for years. IBM made it OK for PC users to move to the smaller medium when it incorporated 3½-inch disk drives into its PS/2 line.

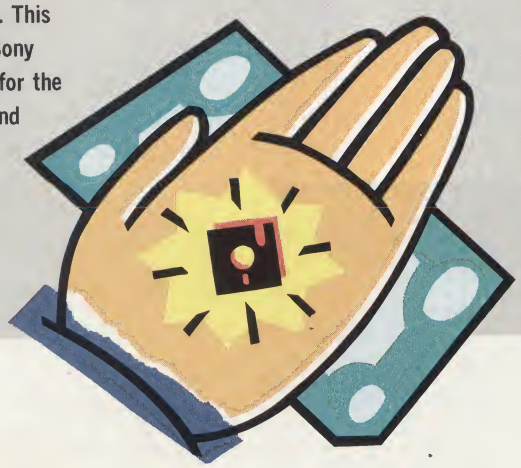
With the greater demand has come a shortage of diskettes and higher prices. This past summer, Fuji and Sony each raised their prices for the second time this year, and Maxell announced a 20 percent increase in August.

Part of the explanation for the price increases may be window dressing to make a good showing in light of a pending International Trade Commission decision, says Robert Gaskin, senior industry analyst for Dataquest. In March, Verbatim Corporation of Sunnyvale, California, a subsidiary of Eastman Kodak, complained that three Japanese diskette makers—Sony, Fuji, and Maxell—were dumping 3½-inch floppies on the U.S. market for 50 percent of what they sold for in Japan.

The ITC found in a preliminary ruling that there was "a likelihood of material injury to U.S. companies," according to supervisory investigator Robert Eninger. The case now goes to the Department of Commerce for another ruling, then back to the ITC for a final ruling.

In any case, relief for the consumer may be in sight. "I don't think the higher diskette prices will continue much beyond this year," Gaskin says.

—Kimberly French



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Mind Your Backups

Backing up a hard disk is like flossing, eating vegetables, and other stuff that's supposed to be good for you: without a nagging parent, you're just not likely to do it. In the world of tape backup, the Personal Archives backup system is that parent.

The $695 (base price) package, from the Palindrome Corporation, is a complete backup system based on an industry-standard QIC-40 tape drive made by the Archive Corporation. The drive packs up to 40MB on a DC2000 tape cartridge, uses your existing floppy disk controller, and fits into a half-height drive bay inside XTs, ATs, and PS/2 Models 50, 60, and 80. An external version ($875) and dedicated controller are also available.

Palindrome, located in Wheaton, Illinois, adds an elaborate set of software that manages the backup process—not just making tapes, but telling you which one to use and where to store it. The menu-controlled system is so easy to master and gives such explicit instructions that you might not need the manual, except to get an overview of the elaborate hierarchy of files and tapes it creates.

Palindrome's Personal Archives is the nagging parent of the backup world.

Personal Archives tracks both tape and disk files by using an instantly accessible on-disk catalog and even monitors file changes. It creates a system that makes sure every vital file is kept on three or more different tapes—either on site, off site, or in transit. It recommends which tape to use for each backup session and for recovery when the worst happens.

Personal Archives also introduces some new concepts to the backup process. A file is considered "saved" only when three copies have been rolled onto tape. Once a file is saved it is not backed up again, which can eliminate a lot of waiting.

The system keeps several backups of still-changing files, called "checkpoints," so you can retreat to earlier versions when your editing goes awry. A file is saved and archived only after it remains static for a length of time you specify.

Personal Archives also allows you to off-load your little-used files from disk to tape, so you can conserve hard disk real estate. Another option is to put zero-length "phantom" files in place of the originals. A memory-resident portion of Personal Archives detects attempts to access these phantom files and instructs you to put the appropriate tape in the drive to bring the file back to reality.

You can, of course, mimic most of the functions of Personal Archives with any backup system, including the lowly floppy disk. The advantage of this system is that it gets you organized and keeps you that way.

Perhaps you won't realize all the sacrifices it makes, working its fingers to the bone, backing up files for your protection and happiness. Someday, though, you'll appreciate it, just as you did when your parents tried to build character by packing you off to summer camp. —*Winn L. Rosch*

Footloose and Fatigue-Free

Is this really necessary? A footrest for feet tired from sitting all day? It seems obvious that what gets tired from sitting sure doesn't sport ten toes.

But, according to MicroComputer Accessories spokeswoman Nancy Dustin, the company's FootEase is designed to relieve the fatigue people get from sitting in one position for too long. Telephone operators, data entry clerks, airline reservationists, and other workers chained all day to their computers are potential customers.

FootEase, a 13-by-19-inch platform, rotates to your preferred position. Available directly from MicroComputer Accessories in Los Angeles, this friend of fatigued feet costs about $50.

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CIRCLE NO. 120 ON READER SERVICE CARD.

Focus on VDTs

Recent studies showing that regular work at a video display terminal causes temporary eyestrain may come as no surprise to the 15 million of us who use one regularly. But a new study suggests that such work may actually be damaging the eye's ability to focus.

Dr. James Sheedy, chief of the Video Display Terminal Eye Clinic at the University of California at Berkeley, reports that a surprisingly high number of his clinic's patients, all of whom work with VDTs, have problems focusing their eyes. Sheedy based his study on evaluations of the first 153 patients treated at the clinic, which opened in 1985. The patients worked an average of six hours a day on VDTs for more than four years, and most considered themselves intermittent rather than constant users.

Sheedy stresses that the study does not prove that the problems were caused by such work, nor does it predict how long they will last after the work is stopped. But the study found that "these [focusing] problems were very frequent in our VDT population and appear to be more common in this population than in other clinical populations."

While it is possible that many of the patients already had focusing problems exacerbated by visually demanding VDT work, Sheedy cautions, "It is also possible that working at a VDT could have caused these problems."

"This study shows just how little we know about the effects of VDT work on our vision," asserts Louis Slesin, editor of New York–based *VDT News*. He believes there is a desperate need to study the long-term impact of working on VDTs. "We need to know what's down the line."

But Slesin adds, "We're not seeing the battery of studies one would expect to see on this issue." Sheedy agrees, contending that the results of his study are good reason to pursue further research.

Sheedy says VDT users can combat vision problems by using high-resolution screens, light screen backgrounds, and comfortable lighting that cuts down on screen glare, and by having regular, thorough eye exams. —*Kenan Woods*

ILLUSTRATION BY JULIA TALCOTT; PHOTOILLUSTRATION BY CANDACE KUSS

No Nukes?

Hundreds of manufacturers claim their VDT filters reduce glare and ease eyestrain, but until the NoRad Corporation came along, we'd never heard one claim to eliminate radiation.

The Santa Monica, California–based firm has developed a filter called the dB60, which gets its superpowers from "millions of black microcrystalline fibrils" that not only cut glare, but apparently also suck up radiation.

Whether the dB60 performs as its maker claims is probably difficult to say without a Geiger counter, but it is a pretty effective antiglare screen. The no-nukes bonus makes its $129 price more palatable. Still, if these fibrils work as well as they say, do you think NoRad can come up with an apron that takes the risk out of microwave cooking?

Laser Printer or Typesetter?

Give a PostScript-compatible, high-resolution laser printer the ability to handle paper sizes up to 11 by 17 inches, and you have the new Varityper VT600W.

The $22,995 laser printer cum typesetter is aimed at professional publishing and CAD/CAM applications, says Pam Fleming, spokeswoman for the East Hanover, New Jersey, company. The VT600W's 600-dot-per-inch resolution, both horizontal and vertical, is four times that of a conventional 300-dpi printer, the company claims.

Using the large format, the VT600W can print masters for tabloid newspapers, or print two pages of a book or magazine in one pass.

The printer comes with 35 Adobe PostScript type fonts, and more may be added. The interfaces—AppleTalk (LocalTalk, RS-422), RS-232, and Centronics parallel—are switch-selectable.

The VT600W's advantage over phototypesetting machines is that it doesn't need to use expensive photographic paper. The toner and developer ink system, however, are specific to this machine. Six packs of the toner cost $108, while a bottle of developer runs about $150. —*Jane Hallisey*

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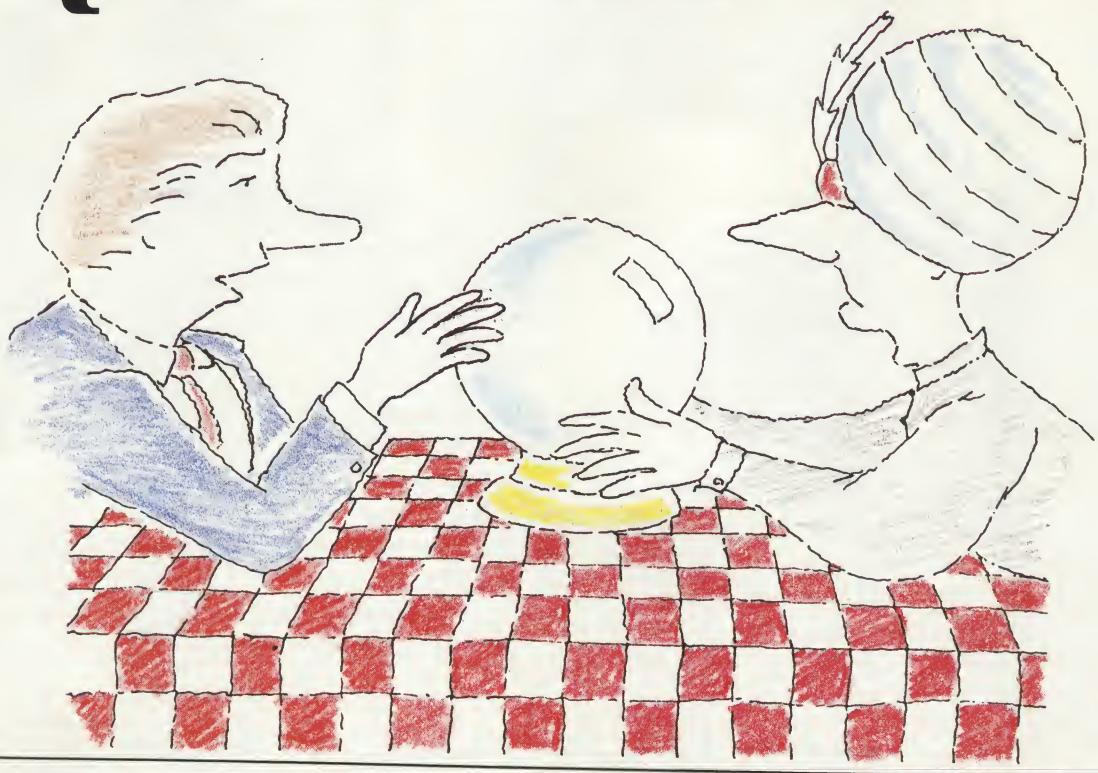

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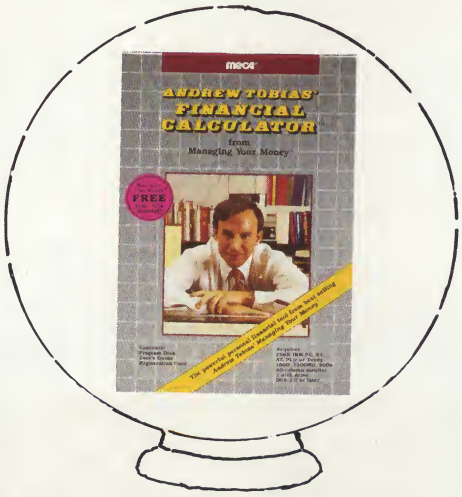

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Write On!

If you're tired of filling out or retyping handwritten reports, give the Linus Write-Top a try. The small, portable tablet converts handwritten input to ASCII files.

Developed by Linus Technologies of Reston, Virginia, the Write-Top is designed to automate the tasks of line personnel, says spokesman Arthur Rodbell, who foresees applications in field service and repair, insurance appraisal, bridge inspection, and medical applications.

To use the Write-Top, you must first teach the device to recognize your handwriting by creating a "personal dictionary" that's stored in the system either on disk or in memory. As long as handwritten letters or symbols are separated from one another and are part of your dictionary, the Write-Top is able to recognize and convert them to ASCII.

Baxter Health Care tested the Write-Top at a hospital emergency room, according to spokesman Ron Bucheger. In emergency rooms, he says, hospitals lose 30 percent of potential revenue because of errors in reports. Typically, after a patient is treated for a fractured femur, for example, a nurse must fill out a long list of the supplies used to treat the patient. With the Write-Top, says Bucheger, the nurse simply touches "fractures" on the menu screen and selects "femur." A list of supplies commonly used to treat that problem pops up, and the nurse enters the number of each supply item used.

Bucheger calls the application "point-of-care computing." By capturing data as it is generated, the report becomes more accurate.

The Write-Top weighs about 9 pounds, but the detachable top piece or notepad weighs about 3 pounds. A battery in the base powers the machine for five to seven hours and takes five hours to recharge. A 12-volt direct current, such as a car's cigarette lighter, can also power the device.

Linus Write-Top gives hospital personnel an edge on efficiency.

The Write-Top has 640KB of memory; an 8088-compatible processor; RS-232C serial, parallel, and keyboard ports; a floppy disk controller for an internal 3½-inch disk drive and an external 3½ or 5¼-inch drive; and a connector for credit card–sized memory cards.

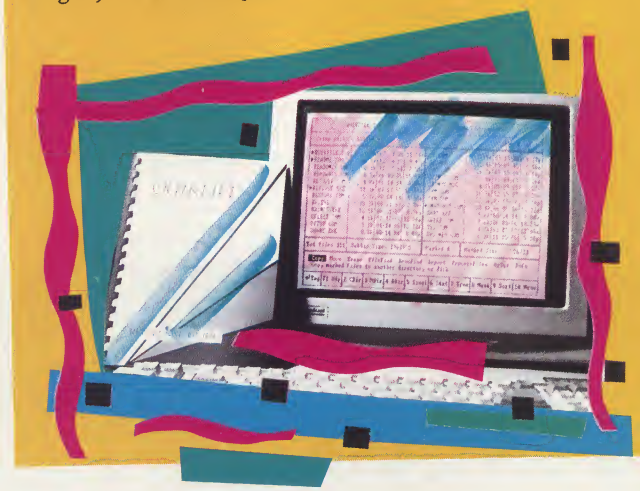
Depending on its configuration, a single Linus Write-Top costs about $2,800 to $3,600 direct from Linus Technologies. A site license for Code-Write, programming software for developing Write-Top applications, is $5,000. The company's only off-the-shelf program, the Just-Write editing and memo-writing package, costs $299.

—Jane Hallisey

DOS Made Fun?

Most people prefer not to meddle with file management and other DOS intricacies. They simply want to get the job done. QuikFile is a DOS shell that makes it easier to control major DOS functions.

Developed by the Delta3 Corporation of Portland, Oregon, the $59.95 QuikFile uses Lotus 1-2-3–like menus and function keys to let users execute most major DOS commands with minimal typing. QuikFile prompts users through keyboard entries, leaving little room for the syntax errors that plague raw DOS users.



The attractive interface displays filenames one subdirectory at a time. QuikFile lets you execute DOS commands on individual files or sets of files. To copy a set, for example, you simply mark the ones you want to be affected. Then, when you execute the Copy function, all the marked files are copied. Other DOS commands such as Erase or Move can be carried out en masse as well.

Some QuikFile extras include searching and sorting utilities, such as a quick way to search an entire disk to locate hard-to-find files; 75-character-long file descriptors that allow you to annotate a file's contents; and an ASCII editor that lets you easily change DOS-typable files.

—Bruce Brown

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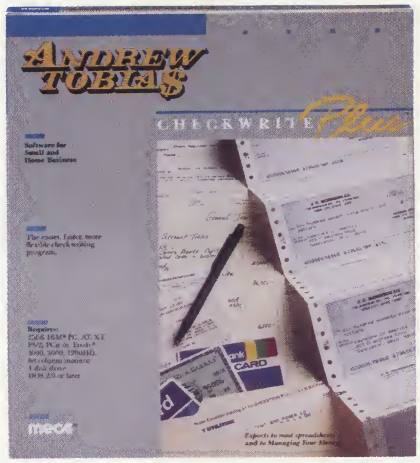

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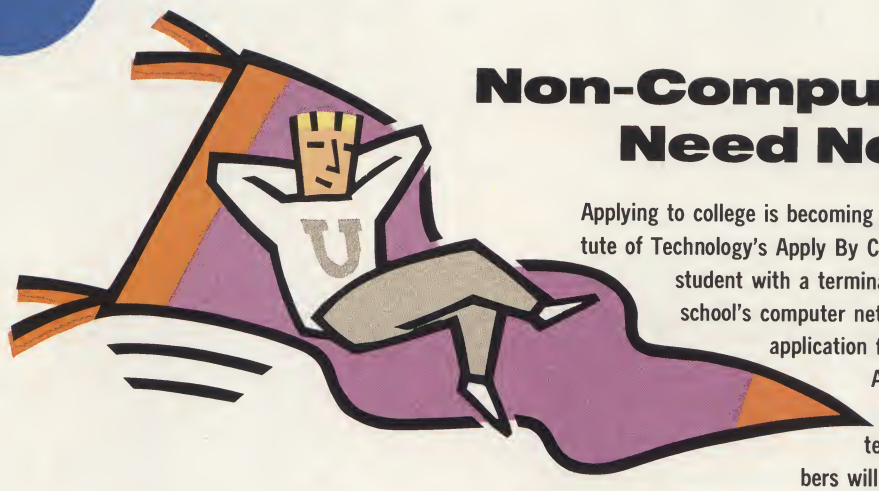

Non-Computer Users Need Not Apply?

Applying to college is becoming as easy as ABC. The Georgia Institute of Technology's Apply By Computer (ABC) system lets any student with a terminal and a modem dial into the school's computer network and electronically fill out an application for admission.

Although only 1 percent of last year's applicants used the system, the school believes the numbers will increase as more high school students gain access to computers, either at home or in school. The whole process takes about ten minutes. A prospective student can also use the system later to find out the status of his or her application.

While computerized admission is admittedly in its infancy, its proponents believe it is the wave of the future. Among them are officials of the University of Richmond in Virginia. Its copyrighted Computerized Application Process (CAP) allows students to fill out their applications on a floppy disk in either an IBM or an Apple personal computer. The program greets the student with the UR insignia, accompanied by the school's fight song. After the last blank has been filled in and the alma mater is played, the student mails the disk back to the school, along with an application fee.

"The CAP system makes the process a lot easier and more enjoyable for the students," says Thomas Pollard, dean of admissions at Richmond. So far, about 600 students have requested the disks to apply for the 1989 school year, and Pollard thinks the number may reach 1,000. Next year, he hopes to have a system in place that will send applications out to students who have a computer and a modem.

Both schools agree that it is just a matter of time before other colleges begin similar programs. "I've been amazed by the positive response from the students, counselors, and other colleges," says Earl Babbitt, information systems coordinator for Georgia Tech.

Application by computer saves the schools time and money by eliminating much of the paperwork that would otherwise be involved. Because the student's electronic application is loaded directly into the school's computer, the system also improves the accuracy of the admissions process.

Applying to college may be getting easier, but getting in is still the hard part. —*Kenan Woods*

ILLUSTRATION BY JULIA TALCOTT

Just the Facts, Ma'am

What does the world need with yet another Rolodex-type software package? This one doesn't even do flips or twists or jump through hoops—it's a no-bones address and telephone manager. Sure, you can do mailings sorted by zip code, but that's not the attraction. It takes only minutes to install and minutes to learn. What a break. Even those too impatient to read directions will find this one easy.

Called RollCall, the package is published by Qandu Computing of Reston, Virginia, and sells for about $50. The screens are simple, there are no complicated keystrokes to remember, and names may be accessed in only two ways—so you don't have to insert code after code to cross-reference information, as you do in some fancier programs.

You can enter a name, address, telephone number, affiliation (company name or category such as "friend"), and any short comment, such as important client information or birthdays.

One warning: make sure that RollCall works with your word processing software. If it is used to insert an address in a Leading Edge word processor document, for example, the computer will lock up. RollCall also won't work if you are in a program's graphics mode.

RollCall will appeal to the beginner and to those whose address management needs are simple. If you don't need bells and whistles or special printouts bound in leatherette, this is your answer.—*Jane Hallisey*

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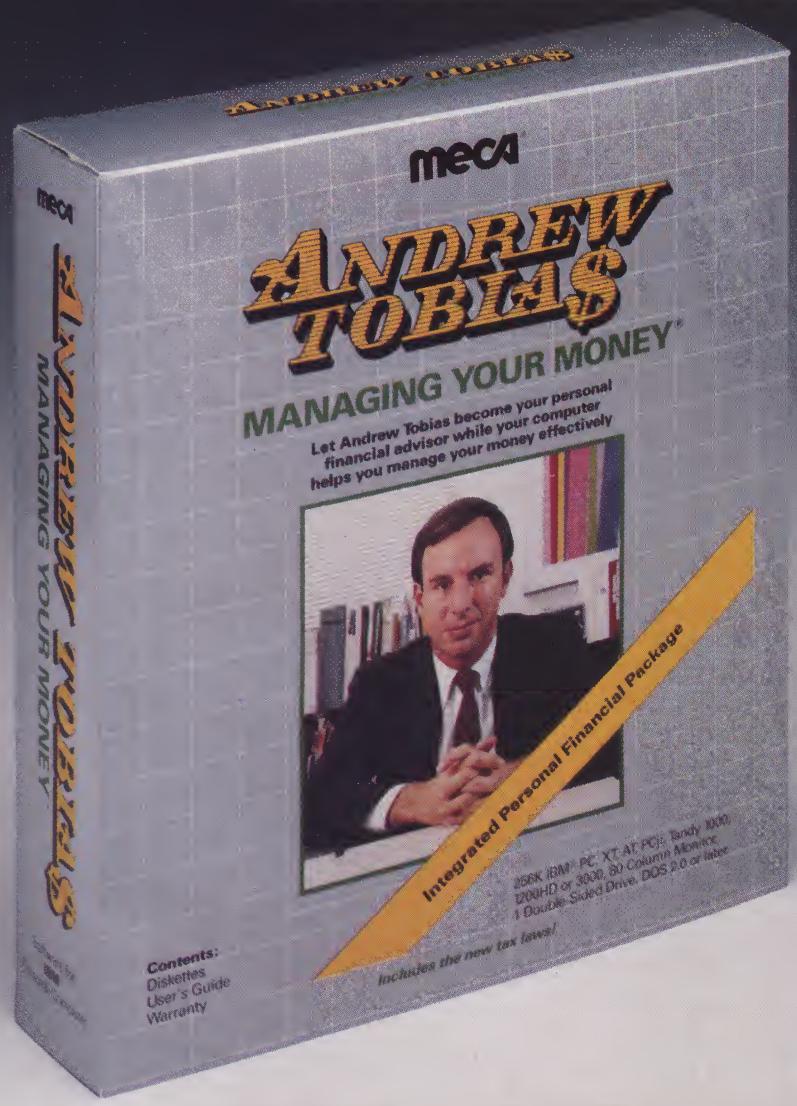

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New York Daily News, "Money Talks," October 4, 1987

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The line is 12 people deep at your office fax machine, but these days you don't have to break out a deck of cards and wait your turn. The fax machine has gone public.

Over 100 fax machines, placed by ActionFax USA of Dallas, have sprung up in hotel lobbies, print shops, malls, airport terminals, and even parking garages in 16 U.S. cities. The public fax booths stand ready and waiting at Dallas/Fort Worth International Airport, Atlanta's Peachtree Plaza, Chicago's Merchandise Mart, New York's Empire State Building, and other sites, from Boston and New Jersey to New Orleans and Costa Mesa, California.

Cheaper than overnight courier services, sending faxes from the credit-card-operated stations is simple, says Steven Gordon, ActionFax's national marketing manager. The system works much like electronic mail. You fill out a cover sheet with your name and credit card number and the recipient's fax number, name, and address. Then place the cover sheet face down in the tray, with your document on top, and press the Send key. The document is transmitted to the closest ActionFax computer center, where it is stored and relayed to the recipient.

Even if you don't know the fax number, you can still send a document by providing the recipient's name and address.

To receive fax transmissions, all you need to do is register with ActionFax at no charge. ActionFax notifies you when you receive a document, which can be picked up at any ActionFax station.

To send a document, ActionFax charges $4 for the first page, $2 each for pages 2 through 10, and $1 each for page 11 and up. Receiving costs $3 for the first page, $1 each for pages 2 through 10, and 50 cents each for page 11 on. International transmissions incur telephone charges.

Though there are a number of other public fax vendors in the market, ActionFax claims to be the first and largest. The company plans to place 1,500 stations within the next few years. —*Patricia Mandell*

Public fax machines may become as accessible as phone booths.

A Loanshark You Can Trust

Rich cousin Joe offers you a low-fixed-rate loan to help you buy that summer house you've been dreaming about. You are suspicious.

Is Ol' Cuz trying to fleece you again? You can test his loan against your bank's by using Loanshark, a Lotus 1-2-3 add-in from George A. Uhimchuk & Associates. Loanshark compares two fixed- and/or variable-rate loans side by side, contrasting different terms, principal amounts, or any combination thereof. Replete with color graphics, it shows the differences in monthly payments and cumulative interest expenses, and it includes a summary of annual amortization schedules.

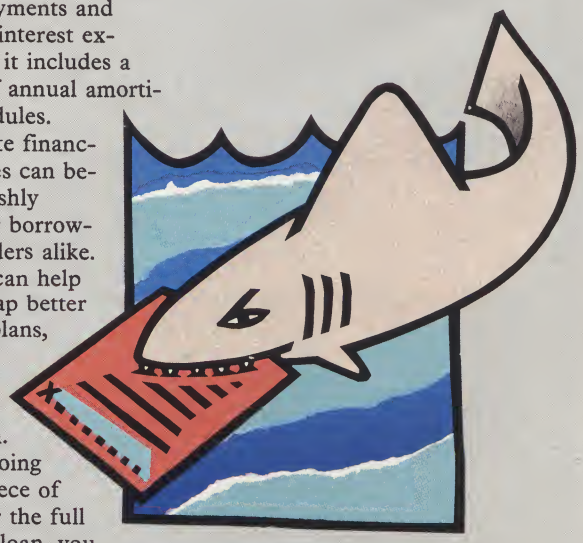
Real estate financing strategies can become fiendishly complex for borrowers and lenders alike. Loanshark can help investors map better borrowing plans, says George Uhimchuk, who wrote the program. "If you're going to hold a piece of property for the full term of the loan, you might follow one strategy; if you plan to hold the property for five to seven years, your strategy will be totally different."

Home buyers aren't alone in their need to scrutinize loans, contends Uhimchuk. Any consumer about to acquire a sizable debt would benefit from Loanshark, he believes.

Loanshark operates in two modes, one for experienced 1-2-3 users and one for novices. The $49.95 add-in is available directly from the Chapin, South Carolina, company.

—*Marty Jerome*

ILLUSTRATION BY JULIA TALCOTT; PHOTOILLUSTRATION BY CANDACE KUSS



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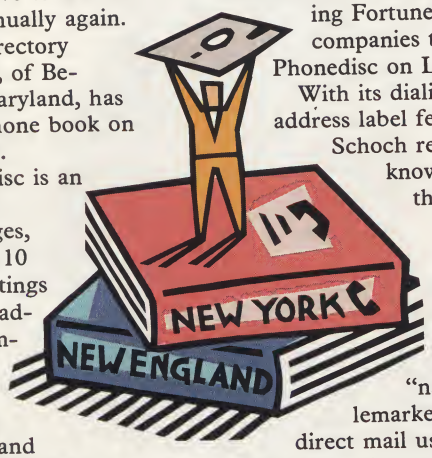
White Pages Go CD-ROM

You don't need to page through bulky phone books or call directory assistance for elusive phone numbers—in fact, you may never even have to dial the phone manually again. Digital Directory Assistance, of Bethesda, Maryland, has put the phone book on CD-ROM.

Phonedisc is an electronic White Pages, providing 10 million listings by name, address, number, and zip code. Searching is simple and speedy—the disc for the New York/New England area, currently the only directory available, lets you scan for a listing in four regional directories covering seven states with just a keystroke.

The electronic nature of this phone directory yields information not available in a conventional phone book. Switching from the name index to the address index, for example, reveals the names of others residing at or nearby an address, and the zip code index can locate out-of-state addresses with local phone numbers. Phonedisc offers a comprehensive cross-reference of alternative spellings, as well as single-line and address label–printing options. It will even dial the phone automatically.

Phonedisc is aimed at fire departments, law enforcement agencies, insurance companies, and other organizations that "need to find people for their business," says DDA president Claude Schoch. DDA is also lobbying Fortune 500 companies to use Phonedisc on LANs.



With its dialing and address label features, Schoch readily acknowledges that Phonedisc could be put to some "nasty" telemarketing and direct mail uses. Such applications, however, are forbidden under DDA's licensing arrangements.

The company expects to release Phonediscs of other regions soon, and evenutally the entire country.

All this information doesn't come cheap: Phonedisc costs $4,900 for one disc, or $10,000 for a yearly subscription of 12 updated discs.

Besides its business uses, Phonedisc is a cure-all for curiosity. Upon receiving Phonedisc, said Schoch, "the first thing people do is look up old boyfriends and girlfriends." —*Peggy Wallace*

Laser Output in Living Color

Maybe you've thought more than once that it would be nice to throw some color into the reams of black and white coming from your laser printer. But short of spending thousands of dollars on a color printer, there isn't much you can do about it, right? Wrong.

Texas Instruments has come up with ColorTouch, a nifty solution that will alleviate the black-and-white blahs for any toner-based output.

Just place a piece of color film on top of a page of boring black-and-white laser output, and insert the whole thing into ColorTouch. The film and page are heated as they pass through, causing the black toner to remelt and the color film to adhere to the melted toner. Peel away the film as the page spills out of the machine, and *voilà!* Color where once there was only black.

ColorTouch doesn't limit you to one color, either. Multicolored pieces can also be produced, according to TI spokeswoman Cindy Smith. "Send the piece through the machine for each different color, each time masking out the portions you don't want to be colored."

The user manual explains the multicoloring operation in detail, and TI includes four pieces of film to practice on.

The film is available in three finishes (matte, metallic, and gloss pastel) and a variety of colors. There are 35 matte colors, 14 metallic colors, and 11 gloss pastels. ColorTouch accepts any length or odd-sized paper up to 8½ inches wide and paper stock "almost as thick as cardboard," says TI spokesman Chris Lamendola.

ColorTouch costs $925, or about as much as a top-of-the-line color ink jet printer. But instead of buying several color printers for occasional use, one ColorTouch could be shared by many. The film comes in boxes of 100 sheets. Matte colors cost $59 per box, metallics are $69, and pastels are $79. Boxes with ten sheets each of ten colors are also available.

TI's ColorTouch lets you bring color to laser output.

TI isn't the first to come up with an after-print color system, however. Kroy, Inc., of Scottsdale, Arizona, makes machines that add color to laser-printed documents. Its Kroy-Kolor Processor sells for $1,295 and accepts paper up to 11 inches wide. Kroy's Color Plus sells for $875 and accepts paper up to 8½ inches wide.

—*Jane Hallisey*

ILLUSTRATION BY JULIA TALCOTT

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The Laser Printer that Created the Future

In 1984 when we introduced what we now fondly call the "LaserJet Printer Classic", people wondered if it would sell. It was "different". It was a breakthrough.

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So when HP's LaserJet Printer appeared, it changed the world.

Setting a New Standard

HP's LaserJet Printer offered speed, quietness and quality in one machine.

Dealers took notice. So did software developers. The LaserJet Printer's ability to print multiple fonts, produce graphics, and shade areas, inspired software developers to incorporate these new features into their packages.

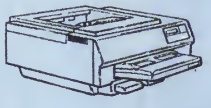
The press was intrigued. In February 1987, Hewlett-Packard's LaserJet Printer lined up with the IBM PC, Lotus 1-2-3, and Apple Macintosh on *Personal Computing's* list of "10 Most Significant Personal Computer Products of All Time."

While LaserJet Printer sales continued to grow, the product development team was busy looking for ways to enhance the printer to better meet customer needs.

Advancing the Standard of Excellence

In March 1987, Hewlett-Packard introduced the new LaserJet Series II Printer. What could customers expect from the new printer? Everything they liked about the "Classic" plus improved ease of use, font flexibility, paper management, and add-on memory. All in a lighter-weight unit that cost less than the original.

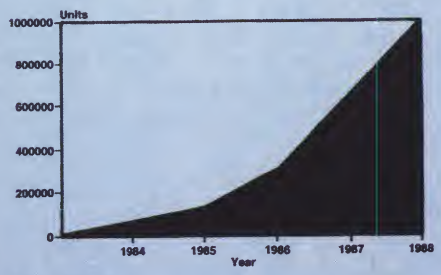
"We'd been listening closely to our customers all along", says Tom Old, customer satisfaction Q/A manager. "Maybe that's why Hewlett-Packard leads the industry in meeting people's needs for laser printing."



▲ **The HP LaserJet Series II Printer**
The most exciting advance in laser printing since HP made it affordable in 1984.

▼ **U.S. Laser Printer Industry Growth In Units Shipped**
HP's LaserJet Printer family has played a significant role in the laser printer industry growth.

U.S. Laser Printer Industry Growth



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The laser printer that's influenced the entire printer industry can help you be more influential, too. The HP LaserJet Series II Printer is today's overwhelming choice for simple word processing, integrated text and graphics, and desktop publishing.

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EVEREX
STEP

The Next Wave

Graphical interfaces are taking over the screen.

ILLUSTRATION BY JOSE CRUZ

DAN BRICKLIN—THE PRINCIPAL author of VisiCalc, the first PC-based spreadsheet—used to illustrate the key difference between personal computers and mainframe and minicomputer systems by drawing two sets of boxes. To depict a traditional mainframe, he would connect a huge box representing the machine's raw computing power to a tiny one representing its user interface capabilities. To show the prototypical personal computer—at that time, an Apple II—Bricklin linked a tiny box representing the computer's intrinsic power to a much larger one representing its user interface.

The Apple II didn't offer much raw processing muscle, but it presented a more friendly, interactive face to the user than any mainframe did. Despite its shortage of power, it broke in a generation of new computer users with what was then a clearly superior model for human/computer interaction.

None of this was accidental.

Individuals who believed it possible to deliver the power of computers to a mass audience in an approachable way planted the seeds of the PC industry when they created the Apple II and other early machines at the start of the 1980s. As they went about defining a new kind of computer, pioneers such as Apple's Steve Jobs and Steve Wozniak defined a new kind of computer user.

Since then, much has changed.

First, and foremost, personal computers have become exponentially more powerful. Today's 80386- and 68020-powered machines make the 48KB Apple IIs and 64KB TRS-80s of five years ago look like toys. At the same time, the cottage PC industry has grown into a gargantuan business, rife

By PAUL BONNER

with petty battles and greedy contenders.

One thing that hasn't changed is the dream of removing the technical barriers that prevent nonspecialists from taking full advantage of the power of the computer. Today, however, the focus of efforts to realize that dream has shifted from attempts to build enough power into a microcomputer to support a simple, text-based interactive interface to efforts to create standardized, high-resolution graphics-based interfaces for the high-powered machines that will dominate tomorrow's desktops.

Most of the major combatants have or are developing graphical interfaces: Apple has Macintosh Finder/MultiFinder, Microsoft has Windows, IBM is offering OS/2 Presentation Manager, Hewlett-Packard is introducing NewWave, and AT&T and Sun Microsystems are readying Open Look. And some companies, like Tandy, that have not traditionally been known as interface designers have produced their own versions. In fact, Tandy's DeskMate is the dark horse of the user interface battle. By all accounts, standardized graphics-based operating environments will rule the computer marketplace by the early 1990s.

Standards

Until now, user interfaces for most PC systems were rather limited: they started and ended with the DOS A: prompt. The task of adding enhancements through which a user could interact with a program fell entirely to applications developers.

And add enhancements they did, each in its own fashion and with little apparent effort to conform to interfaces from other developers. Lotus 1-2-3 used a two-line menu system, accessed by pressing the slash key; WordStar got by with Ctrl-key combinations; Framework used drop-down menus; others used variations on those designs or devised entirely different features.

As a result, even experienced users had to start from scratch when learning a new application. Even assuming that you managed to wade through the manual far enough to install the program on your system and get it running, you were at a loss as to how the program would operate once it appeared on your screen. Would pressing the F1 key bring up a help screen, or would it erase your file from memory—or maybe repartition your hard disk? Your experience with other programs couldn't give you the answers.

In addition, software developers spent much of their time reinventing the wheel when designing new interfaces for their products (or copying the wheel, in the case of some lookalike products). Time spent designing an innovative menu system inevitably was time taken away from finding new ways for people to take advantage of the PC's power.

Finally, the lack of a standard user interface meant that software development perpetually lagged far behind advances in hardware technology. The maker of a new high-resolution display adapter, for instance, had no way to create a driver that would allow any PC application to take advantage of the display's capability. Instead, the burden was on software developers to start from scratch and build drivers for the display into their programs. Otherwise, as often happened, developers simply ignored the capabilities of a new display because, in their minds, the time required to develop drivers outweighed the benefits of being able to support the new display.

Since its release in January 1984, Apple's Macintosh has been the most notable exception to this standoff. The Macintosh offers a standard interface, with elements such as multiple onscreen windows, icons that represent disk drives and files, pop-down menus, "alert" boxes that warn you that the command you've issued could have destructive consequences, and a mouse.

The Macintosh Model

These elements greatly simplify many of the basic tasks associated with the use of any computer system. For instance, to copy a file from one disk to another, you simply open the folder containing the file (by placing the mouse pointer on the folder's icon and double-clicking the mouse) and then drag the file you wish to copy to the correct folder on the destination disk. To achieve the same thing on an MS-DOS system, you would have to enter something like COPY C:\XY\CURRENT\DOCS\TRIAL.DAT D:\123\WKSHEETS\ at the command line, and do so rather carefully, since DOS has no tolerance for errors. On the other hand, if you know your way around DOS, you'll find that it does certain things better or more easily than the Macintosh's Finder operating system.

"Technology for its own sake will excite power users, but applications will ultimately drive

INTERFACES IN DEPTH

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OS/2 Presentation Manager
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NewWave
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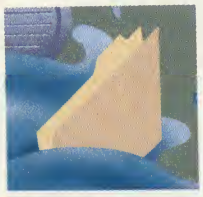
Paul Bonner is a senior editor of PC/Computing.

the acceptance of technology," notes Peter Miller, partner of Lotus founder Mitch Kapor in ON Technology, a new company in Cambridge, Massachusetts. "If you can't do what you want using current technology, you'll move in a new technological direction."



Miller sees a graphical user interface as an important component of a new wave of PC applications. "In the 1990s," he predicts, "there will be a shift away from analytic products to products that emphasize information and communication. That's going to require the right tools, and part of that is a graphic user interface."

Until now, the graphical user interface, as typified by that of the Macintosh, has primarily been successful in select applications that directly benefit from its graphics capabilities, including desktop publishing and computer-aided design. Robert Carr, a partner in the Go Corporation and the principal author of Framework, an integrated package for the IBM PC that uses a character-based windowing interface, explains the success of the Macintosh in these areas: "The major thing missing in character-based interfaces is typography on the screen and at printout time. The Mac has been raising our expectations for computer output for four years now.

By all accounts, standardized graphics-based operating environments will rule the computer marketplace by the early 1990s.

"Printouts can look a lot better if you use a few fonts, and a graphics environment provides building blocks for doing that. If people don't need to do that, then the incremental benefits of a graphics environment over a character one are pretty small."

Miller agrees, saying, "If you're a financial analyst doing 1-2-3, there may be no reason to upgrade [to a graphics-based interface]. It really depends how you use your machine. If [Microsoft's Windows-based] Excel is so powerful on the PC, why hasn't everyone switched over—why does 1-2-3 have such staying power? Because it's an appropriate tool for the job. If you're doing desktop publishing, that's a totally different world. That's the big innovation of the graphical user interface."

For all the vaunted ease of use of graphical interfaces, Miller notes, the person who runs only one application may not care whether or not it uses a graphics-based interface. "It's just as easy to learn to use 1-2-3 as it is to use Excel," he says. "But where the graphical user interface holds water is on the consistency side, when you learn new applications or use multiple applications."

As Miller suggests, one of the most important benefits of a standardized interface is the carryover of know-how when you switch from one application to another. On a Macintosh, for instance, where the vast majority of developers have closely adhered to Apple's guidelines, everyone who has learned a Macintosh application knows how to use any other Mac application to perform such basic but key tasks as loading or saving a file, copying or deleting data, and printing. Moreover, they should be able to navigate easily through the new application's menu system to explore most of its capabilities.

The degree to which an interface standard supports this carryover is a good measure of its effectiveness. Ideally, if you have learned one application that uses a particular standard and you know what a second application that uses that same standard is supposed to do, you should be able to take advantage of all the second application's capabilities without ever touching a user manual.

Paying the Piper

Why has it taken until now for other key PC manufacturers to enter the battle with graphics-based user interfaces of their own? After all, the Macintosh was introduced more than four years ago, and its key benefits were evident almost from the start.

Aside from the extended development cycle of a product such as IBM's Presentation Manager, the most compelling reason for the delays was that the underlying PC hardware and system software had to grow up before a graphics-based interface could be successfully implemented on top of them. A bit-mapped graphics display and the other features of a Macintosh-like interface consume tremendous computing resources—resources that until recently simply weren't available in most desktop PCs.

From the beginning, the Macintosh had some key advantages over MS-DOS machines in this regard. The building blocks of its user interface were built into ROM, and they were intimately tied to the Mac's basic file management system. In contrast, on a PC an interface such as Presentation Manager or Microsoft Windows has to be loaded into RAM, where it eats up valuable memory that an application could otherwise use. It also has to deal with a file management system designed for use with a command line interface.

Despite those advantages, even the Macintosh struggled to keep up with the processing overhead involved in supporting a complex graphics-based interface until its base RAM was increased from 128KB to 512KB and then 1,024KB, and until internal hard disks became standard items with the Mac SE. Given that added memory, it's easy to understand why early PC implementations of graphical

user interfaces, such as Microsoft Windows, looked like bad jokes trying to run in standard PCs or slow versions (with clock speeds less than 10MHz) of the AT. As ON Technology's Miller notes, "For the graphical interface to become as fully entrenched as the DOS interface, it needs enough machine resources to make it as efficient as the standard user interface for DOS."

With the advent of 80386 and 386SX microprocessors and the proliferation of high-speed versions of the 80286, Miller says, "those resources—the basic horsepower—will be here." But even if, as Miller suggests, the horse is strong enough to pull the cart, you have to wonder if it will be smart enough to know where to go.

The overall richness of the Macintosh interface in large part derives from the close links between the user interface and the machine's underlying file management system. These links are evidenced by such niceties as the Mac's ability to find an application, no matter where it's hidden on your disk, whenever you open a document created by that application, and by its acceptance of filenames up to 30 characters long.

These links in the Mac make users feel as if the computer understands what they are trying to do and is an active ally in the process. That impression is so unlike DOS's benign indifference that it raises the question: Isn't any graphics-based interface built on top of a DOS—or for that matter, an OS/2—command line going to be brain-dead at birth? Or can it shield the user from DOS paths and eight-letter filenames and endless lists of .com and .exe files?

One of the most important benefits of a standardized user interface is the carryover of know-how when you switch applications.

The answer appears to be that the horse at least has the potential to think for itself, although some of the early entries in this sweepstakes are nags, according to Stewart Alsop, publisher of *The PC Letter.* Current versions of IBM's Presentation Manager and Microsoft Windows don't offer an equivalent for the Macintosh's icon-based desktop, the visual metaphor for the Mac's underlying file system, notes Alsop. "Presentation Manager and Microsoft Windows are missing the file management system," he says. "When you look at Presentation Manager, you ask yourself, 'Where's the desktop?' "

Miller is somewhat pessimistic about whether systems built on top of command line interfaces will be able to overcome these problems. "Windows and Presentation Manager will never be as smooth as the Mac. The reason the Mac looks and feels the way it does is that it never had any baggage to carry with it," he says. "Whenever you graft something on, you'll always have rough edges."

Go's Carr notes that Hewlett-Packard's NewWave, which is an extension of Microsoft Windows and much more, uses an icon-based file system with functionality that goes well beyond that of the Macintosh system. "I suspect that this problem will be solved with Presentation Manager," he says. "NewWave proves you can layer an object-oriented file system on top of Windows."

Alsop was also impressed with NewWave: "Hewlett-Packard has gone beyond the Macintosh. The Mac is four years old, after all." But based on what he's seen of IBM's OS/2 Presentation Manager, due for release this fall, Alsop adds, "The disturbing thing about Presentation Manager is that it's a step behind the Mac, not a step ahead. IBM is working on an integrated file management system for Presentation Manager, but they don't seem to recognize any of the research that's been done on user interfaces."

Lookalikes

In the end, the extent to which these various graphical interfaces integrate their file management systems may be one of the few ways users can tell them apart. Each has its strengths and unique features, but, for the most part, one point-and-click interface looks like another. "There are not and will not be significant differences in terms of what these interfaces provide," says Carr. "The user should focus on the applications available in a particular environment and the price/performance trade-off of its particular hardware environment."

The differences in these environments will probably revolve around the ways the various combatants "extend" the basic Macintosh interface. Apple itself has done a good deal of extending since it first introduced the Mac, offering enhancements such as the MultiFinder hierarchical filing system and HyperCard.

Alsop thinks Apple or a competitor can do a good deal more. "There are a lot of opportunities to extend the Macintosh interface—to decide what goes into the ROM next, as they say at Apple," he says.

Among the possibilities Alsop suggests as additions to the basic Macintosh operating environment are hypertext (automatic links between text and/or graphics), NewWave-like agents (cross-system macros), rich text (text that maintains its formatting attributes when copied between applications), more extensive use of the machine's sound capabilities, and built-in electronic mail and other communications capabilities.

Carr feels that the systems built on top of OS/2 have the best chance of extending the standard

graphical interface, because "OS/2 is a far more robust and powerful operating system kernel than anything that Mac has. It's a great foundation to build on top of—the multitasking and interprocess communications that OS/2 provides make it [the equivalent of] a good traditional minicomputer operating system."

In contrast, he says, "the Mac is built on a foundation of sand. I know Apple can build a good multitasking kernel, but the challenge is to do it and provide a smooth upgrade path. Microsoft and IBM have already started down that path. I think Apple is putting off paying the price."

Even at this fairly early stage, graphical user interfaces are critical weapons in the PC industry's ongoing battle to make computers a more natural and responsive tool for the general user.

MACINTOSH FINDER/MULTIFINDER

The interface for the rest of us

APPLE'S Macintosh environment, introduced in January 1984, is the granddaddy of today's interfaces. The beneficiary of many enhancements since its introduction, the Mac shows few signs of premature aging.

For today at least, the Mac is the best-supported and most complete interface alternative, with thousands of professional applications available to take advantage of its features. These applications include such standouts as the Microsoft Excel spreadsheet, Microsoft Word, Adobe Illustrator, Claris's MacProject II, and Aldus PageMaker 3.0. More Macintosh applications appear just about every week.

The original 128KB Mac embodied brilliant interface design concepts, but it was too slow and underpowered to be of value to business users. A slew of enhancements has changed that image. First came the 512KB Macintosh, then the 1MB Mac Plus, and finally the Macintosh SE—the first with an internal hard disk and expansion slot—and the magnificent 68020-based Mac II, which features a rich color display and six expansion slots in a PC-like chassis. The Macintosh line now offers an array of machines versatile and powerful enough for any microcomputer task.

Observers also worried about the Macintosh's lack of compatibility with the MS-DOS standard and feared it would forever remain a disconnected stepchild in the corporate networks of the future. The availability of a DOS add-in board for the Mac II has addressed some of those concerns, but the question has essentially vanished in a cloud of connectivity products. These include the TOPS network, which lets PCs and Macs coexist and exchange files freely on a local area network; the DaynaFile 5¼-inch disk drive, which allows the many Mac applications that can read PC-format files to access them; and a host of options from Apple and other vendors that give the Mac links to Digital VAXes, Unix-based minis, and IBM mainframes that are at least as advanced as any available for MS-DOS machines.

The Mac is not without its dark side. Apple's two attempts at forging the Mac interface onto multitasking operating systems—MultiFinder and A/UX—have both been roundly criticized as buggy memory hogs. MultiFinder is the more reliable of the two for use with standard Mac applications, but lacks the robustness of a true multiprocessing operating system such as OS/2. A/UX simply doesn't work well with many Mac applications.

In addition, the specter of Apple's ongoing legal battles with Microsoft and Hewlett-Packard over what Apple claims are violations of its patents in Windows and NewWave will probably hover over the Macintosh for quite some time, sullying Apple's reputation among corporate users.

But the Mac's most impressive attribute remains unblemished: it is all but impossible to find anyone who has ever used a Mac regularly who doesn't love the machine and its interface. What other product, let alone computer system, attracts such unwavering devotion and affection? All this simply suggests that other developers have chosen the right model in their attempts to emulate the machine Apple calls "the computer for the rest of us." *—PB*

COURTESY OF APPLE COMPUTER, INC.

An improved picture

MICROSOFT Windows got off to a rocky start even before it began shipping in late 1985. Development delays held back its release by 18 months, and once the original Windows did finally ship, it was clear that the processing overhead associated with its multitasking, graphics-based environment was too much for the average PC to handle. Windows' ability to implement a Macintosh-style interface, with multiple onscreen windows, a mouse controller, pull-down menus, multiple fonts, and icons representing active applications, was impressive. But no operating environment—no matter how well designed its interface—is truly user friendly when even the simplest actions require an endless wait while the machine tries to process your requests.

Since then, the picture has improved dramatically.

To work effectively, the Windows user still needs to understand the DOS directory and file management system.

Version 2.0 of Windows boasted a wide range of performance enhancements.

But more than from anything Microsoft's coders have done, Windows has benefited from a rapid advancement in PC hardware design. The 8MHz IBM PC ATs that were considered speed demons in 1986 have been left in the dust by 80286-based machines operating at more than twice that speed, and by the advent of the 80386-based PC, the machine in which Windows seems most at home.

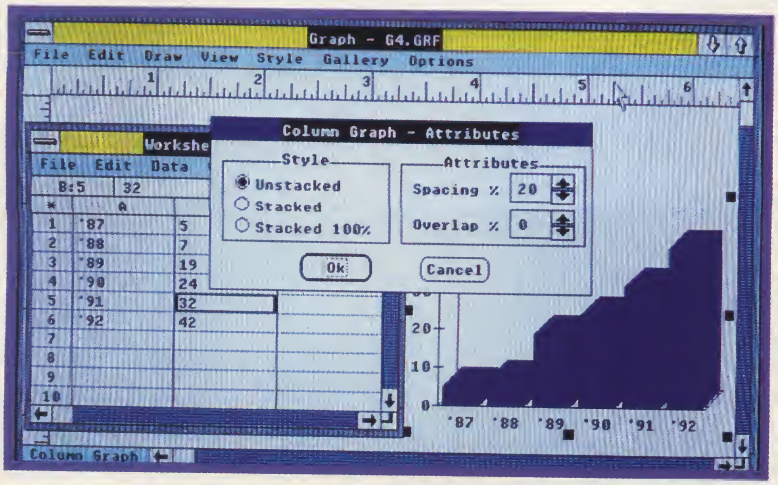
Windows-386 has been unleashed from the hardware constraints that limited earlier versions, and in turn unleashes the full power of 80386-based machines. It offers 80386 users a responsive, easy-to-use multitasking operating environment for running both Windows-specific and standard DOS applications.

Moreover, Windows has slowly but surely started to attract the attention of applications developers. Several major Macintosh applications, including Microsoft's Excel and Aldus's PageMaker, have been ported to the Windows environment, and Texas-based Micrografx has produced a series of top-notch graphics programs with capabilities that rival those of the leading Mac II applications.

Still, Windows is a long way from winning wide acceptance. Part of its remaining problem stems from the fact that the high-speed 80286s and 80386s with which it works best remain a distinct minority in the installed base of PCs.

Moreover, although support of Windows is growing among applications developers, it has been hampered by significant changes that took place in the Windows programming interface between Versions 1.0 and 2.0, and by more changes to come between Windows and the OS/2 Presentation Manager. Some developers doubt the future of Windows after IBM releases Presentation Manager. And some are reluctant to develop products for an interface that profits Microsoft, since many consider the company one of their leading competitors.

In addition, even on the fastest machines, the Windows interface lacks the intuitiveness and basic ease of use that the Macintosh offers. Windows has been imperfectly grafted on top of the traditional DOS command line interface. Even though it employs the mouse, pull-down menus, and windows, as the Macintosh does, its ties to the underlying file management system are nowhere near as tight as those of the Mac. The Mac's object-oriented file manager is inseparable from its user interface. In contrast, the Windows MS-DOS Executive file manager merely puts a colorful face on top of the traditional, often cryptic, DOS system. To be able to work effectively, the Windows user still needs to understand the DOS directory and file management system.



In today's DOS-based environments, Windows is most useful on 80386 machines, for which it is an admirable "switching" program for moving among standard DOS applications. In the long run, however, Windows' viability

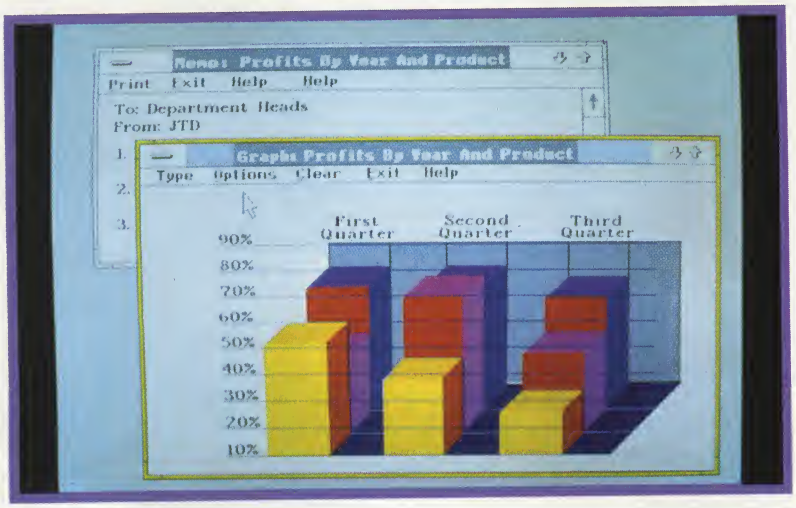
would seem to rest on how closely it can emulate IBM's Presentation Manager, and on how far Microsoft's engineers are able to extend the Windows interface to emulate the Mac's more intuitive file management functions. —*PB*

OS/2 PRESENTATION MANAGER

Gateway to untold power?

IBM'S OS/2 Presentation Manager could one day rival Lotus 1-2-3 as the most influential PC software ever. It is destined to affect the look and feel of nearly every major application running under OS/2.

IBM has made Presentation Manager (PM) a critical part of its efforts to build a standardized user interface (the Systems Application Architecture Common User Access Interface) for its entire product line, from PCs to mainframes. Because of IBM's strategic commitment, PM has become the de facto programming environment for OS/2. Almost every major applications developer has indicated that its OS/2 offerings will use the interface.



Presentation Manager's visual elements bear a strong resemblance to those of Microsoft Windows, upon which much of the PM code is based. But they also reflect IBM's SAA (Systems Application Architecture) guidelines, which dictate that PM applications conform to a detailed set of user interface specifications. These specs cover everything from function key assignments—for instance, F1 always summons a help screen—to window colors, to the appearance and organization of dialog boxes, drop-down menus, and file save-and-retrieve operations.

As developers and users have discovered with the Macintosh, this kind of standardization greatly speeds the process of learning to use an application. Unlike Windows, which must go to great processor cycle-consuming lengths to simulate multitasking and communication between applications in the DOS environment, Presentation Manager is graced by the underlying power of OS/2, a minicomputer-class operating system that has intrinsic support for multitasking, multithreaded operations, and interprocess communications.

As a result, you can expect to see a new class of applications blossom under Presentation Manager: spreadsheets that automatically open a communications channel and retrieve data stored on a remote mainframe when you open a file; group tools that consolidate diverse communications links (such as LAN-based electronic mail, MCI Mail, and mainframe- or minicomputer-based executive information systems) and route messages to other group members by the most appropriate means; database applications that integrate data in a corporate network no matter where the data are stored; and so on.

Work on applications such as these, and on new ones that most personal computer users haven't even dreamed of, is already under way. But don't count on finding them in your stocking on Christmas morning. Producing PM applications is a significantly more complex process than writing programs to work under DOS, and even the most optimistic observers estimate that it will be at least a year after Presentation Manager is shipped before more than a handful of PM applications come to market.

Perhaps in the interim the cost of doing business under OS/2 and PM will drop to a more reasonable level. Currently, the combination of high RAM prices and OS/2's extraordinary hardware requirements means that a machine equipped to run at a decent clip costs $8,000 to $10,000 (based on a high-speed 80286 or 80386 PC with at least 4MB of RAM and 40MB of hard disk space, plus a VGA-class graphics adapter and monitor).

Don't count on finding new applications for PM under the Christmas tree.

For now, all you get for that investment is a high-cost equivalent of Windows 386—a colorful control program that will let you move back and forth among the few text-based OS/2 programs now available. Exactly what that money will get you in the future depends almost entirely on the quality of the applications designed to work with the interface.

If the loud public promises PC software developers have made for their OS/2 products turn out to be true, Presentation Manager will serve as the gateway to a new class of PC applications with untold power. If not, you might be better off investing in a Mac. Time will tell. *—PB*

NEWWAVE

At the crest of powerful connections

CATCH a ride on NewWave and you may never want to go back to your old means of locomotion. This user interface from Hewlett-Packard has the potential to do more than merely help you run software more easily. Due out by the end of the year, NewWave could completely change the way you think about computing and the way you use your PC.

NewWave runs on top of Windows, so you can switch to Windows whenever you choose. The interface is expected to run on top of IBM's Presentation Manager as well, although the PM version will require more memory than the 2MB the Windows version requires.

At first, NewWave doesn't look or feel much different from most other graphical interfaces. It has the usual icons, pull-down menus, and mouse-driven pointer. You click and double-click with abandon, pulling files out of folders, running software, deleting files, and in general getting around without resorting to the familiar C: prompt.

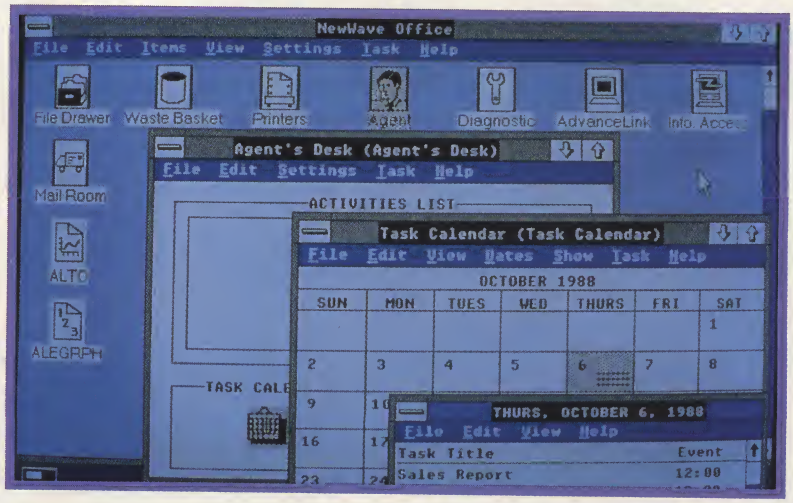
But the conventional-looking exterior doesn't even hint at what's going on beneath the surface. NewWave lets you concentrate on the work at hand, rather than on the software needed to do the work.

To that end, you pull out the documents you're working on, not individual pieces of software. To complete a sales memo that includes a 1-2-3 worksheet, a pie chart, and text, for example, you'd call up the document itself. When you need to do something to the worksheet part of the memo, you simply click your mouse on it, and 1-2-3 automatically loads. Work you do in 1-2-3 is automatically reflected in the sales memo's worksheet. Similarly, clicking on the pie chart brings up a graphics program, which you can use in the same way.

Beyond that, NewWave lets you establish "hot links" among documents. If you linked the worksheet in the above example to a sales letter and a quarterly report as well as the sales memo, NewWave would automatically make the worksheet changes in all three documents.

NewWave's exterior doesn't even hint at what's really going on.

NewWave also includes an "agent" for creating supermacros. These macros can automate many complex tasks across different applications. If, for example, you know that on the 15th of every month you need to grab sales information from a database, load it into 1-2-3, manipulate it in a certain way, create a sales memo that includes a chart and a graph of the information, and send it off to your boss via electronic mail, the agent will do all that for you, every month, like clockwork.



All this power remains potential; NewWave will work this way only if software developers write applications to take advantage of all its capabilities. Existing DOS programs will run under NewWave, but they will not make full use of its strengths.

—Preston Gralla

OPEN LOOK

Specs, not software, that make Unix easier to use

OPEN Look—designed to make the notoriously difficult Unix operating system easier to use—accomplishes its goal, combining Unix's hierarchical organization with Xerox's multitasking capabilities and the Macintosh's ease of use.

Sun Microsystems was the primary developer of Open Look, with input from AT&T and technology licensed from Xerox. Although the system is not yet finished, and the first applications to support it are not due until early next year, a working demo became available for software developers last summer.

Unlike other user interfaces, Open Look is *not* software. Instead, it's two books of specifications and guidelines for toolkit and applications developers. The *Open Look Functional Specification* describes the visual and functional requirements for an Open Look toolkit, a set of programmed components to speed applications development. The *Open Look Style Guide* helps applications developers port existing software or develop new programs.

At first glance, the Open Look interface looks a lot like a Macintosh interface, only more so. That's not surprising, since one of the design goals is to be harmonious with other user interfaces. Open Look seems to represent an incremental improvement, rather than a radical change in design philosophy.

Perhaps the key difference between Open Look and the Mac is the new interface's ease with multitasking. The Mac's multitasking enhancements have a number of shortcomings, but Open Look was born

TANDY'S DESKMATE

The Dark Horse of Graphical User Interfaces

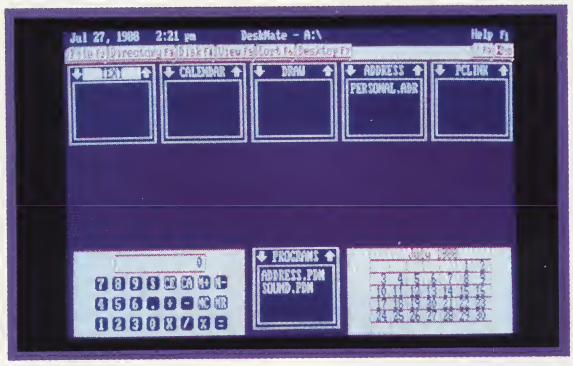
When the roster of graphical user interfaces is posted, Tandy's DeskMate is often absent from the list. It's the dark horse of user interfaces, eating the dust of the major competitors: Macintosh's Finder, Windows, Presentation Manager, Open Look, and NewWave.

DeskMate's problem is not that it's incapable, inflexible, or unusable, but rather that too few people realize it will run on non-Tandy computers. True, each machine in Tandy's recently launched 1000 line has DeskMate in ROM—boot up, and you get a clean, simple operating environment with drop-down menus and onscreen data boxes.

But DeskMate isn't a Tandy-only product.

For $99.95 you can pick it up in most Radio Shack stores. This modest outlay buys you much more than a graphical environment: DeskMate is bundled with accessories (calendar, address book, alarm, calculator) and applications (word processor, filer, drawing program, forms handler, communications, and simple spreadsheet). Tandy also throws in software for Quantum Computer Systems' PC-Link online database.

All this software makes DeskMate more competitive; otherwise it might languish, since few other developers—only about 14 at press time—are adapting applications for the DeskMate interface.



But you're not limited to using the dozen or so DeskMate-specific programs now available. The interface lets you execute programs from DeskMate, but then you give up the DeskMate look and feel.

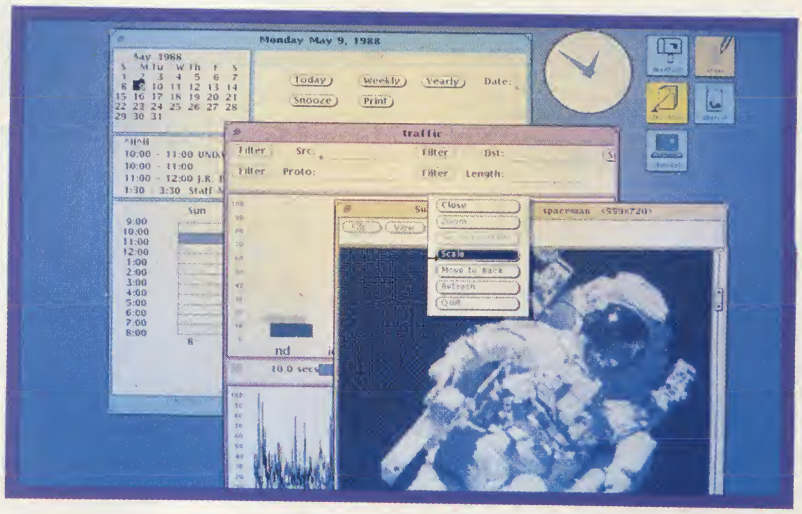
You can multitask between two programs through DeskMate's Task Switch accessory, though memory-resident programs and applications that take over the keyboard won't work. Navigation via mouse makes the most sense, but DeskMate lets you get around by using the keyboard a lot more easily than other environments do.

Tandy also offers the Workgroup Companion to DeskMate, which, for $149.95, gives you network extensions, electronic mail, group calendar functions, shared printer facilities, remote connection capabilities, print redirection, and more.

DeskMate is inexpensive and easy to get around in, and it comes minus the hardware overhead of programs such as Windows and Presentation Manager. If you want simple multitasking and a raft of desktop accessories but don't want to spend much cash, DeskMate's the one. —*Chris Shipley*

Chris Shipley is a senior editor of PC/Computing.

in a multitasking environment and doesn't have to stretch to do two things at once. Open Look can simultaneously display windows in different scales, for example, or allow users to modify multiple windows at once.



Each window also has its own control area—important for multitasking—and you can locate it anywhere in the window. Developers can also put in more than one command area for each application, so users can view two parts of a file at the same time.

Open Look will support a one-, two-, or three-button mouse, and its fascination with buttons doesn't end there. "Flat" graphical buttons execute a single function; "stacked" buttons reveal menus of choices underneath.

In addition, the system provides shortcuts to cut down on cursor movement. "Floating" menus sit near the area where work is being done, and users can "walk" through submenus to get at specific options. The up and down arrows move along with the scroll bar to make it easier to find the precise part of a file you want. A "pushpin" icon sticks menus and pop-up windows to the desktop so you don't have to call them up each time you want to use them.

Born in a multitasking environment, Open Look doesn't have to stretch to do two things at once.

Open Look is an open system, so it will never truly be finished. "Some things are very important to pin down," says Tony Hoeber, head of the design team, "but in other areas we want to leave room for innovation—with a consistent look and feel."

The developers at AT&T and Sun are still debating whether to specify a file manager for the interface or leave it to individual developers. Each company is developing its own file management applications.

The elaborate Open Look File Manager, which can graphically display the hierarchy of files and applications in a path or a tree format, looks impressive. As on the Mac, each document is tied to a certain application, so calling the file to the desktop automatically loads that application. To load a file into an application, you merely drag the file's icon from the file manager to the application window. To print a file, you drag the icon over to the Print icon on the desktop.

Both AT&T and Sun are banking heavily on Unix, and they are counting on Open Look to help dispel Unix's reputation as being hard to use. But the companies also hope Open Look toolkits will be created for all kinds of operating systems on all kinds of computers for all kinds of applications, from simple document processing to advanced computer-aided engineering.

The key is support for the software industry. Several developers—including heavyweights Ashton-Tate, Autodesk, Borland, and Lotus—have expressed interest in the new interface. But Open Look's success will depend on just how much useful software these developers actually produce for it. —*Fredric Paul*

Preston Gralla and Fredric Paul are senior editors of PC/Computing.

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DOS 4.0: DOS With

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File Options Arrange Exit

drive.

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Move...
Copy...
Delete...
Rename...
Change attribute...
View

Create directory...
Select all
Deselect all

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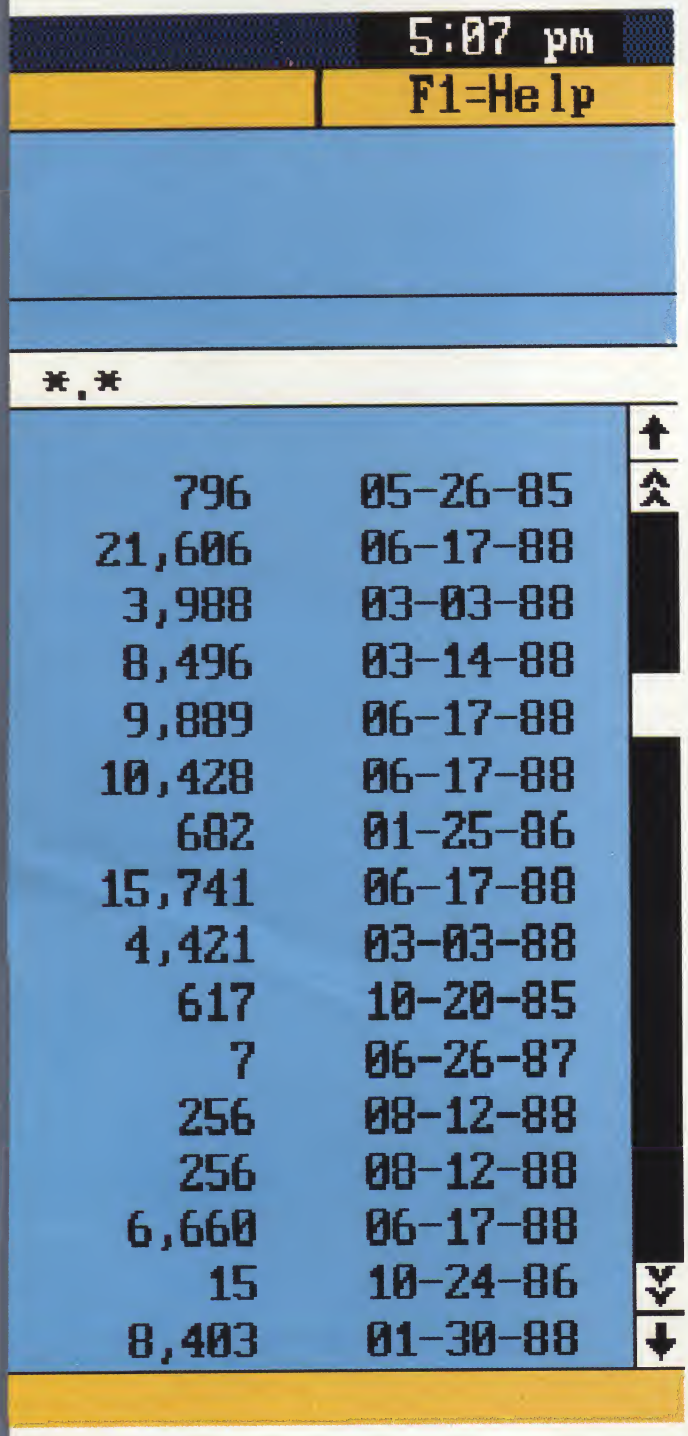
F10=Actions Shift+F9=Command Prompt

out Tears



Part 1 of 2: DOS 4.0's DOS Shell tames just about every formerly nightmarish system chore.

By PAUL SOMERSON

The very first edition of DOS, introduced in 1981 to support the PC-1, was a grab bag of wimpy utilities swiped from earlier operating systems. Its main Command.com processor was one-tenth the size of the one in the current DOS release. You had to run separate standalone programs to set the date and time. You couldn't store more than 160KB on a single diskette. And if you wanted to do much more than see what was on your disk, or rename, copy, and erase files, you were flat out of luck.

This wasn't such a problem back then. IBM was selling computers with a laughable 16KB of RAM on the motherboard and telling users to store their data on cassette tapes.

In early 1982 IBM and Microsoft corrected a handful of bugs, added several new operating system features, and released DOS Version 1.1. The new DOS manual contained an ironic closing note: "We've just brushed the surface of the many enhancements."

They weren't kidding.

When IBM released its XT, it rewrote DOS to handle all the problems created by subdirectories. This fat new DOS version (and the even fatter manual) added over two dozen new utilities and substantially beefed up most of the existing ones. The following year IBM trotted out DOS 3.0, which streamlined hard disk management on its new AT, and (eventually) ran on networks.

Minor DOS enhancements followed, some of which came with powerful new utilities such as Subst and Xcopy.

But through seven years of upgrades, IBM still hadn't made it any easier to learn the ropes or do simple tasks such as moving groups of files from one place to another. Beginners who thought they'd just press a button or two and have their new computers do all the work found themselves staring at a lonely DOS prompt on an otherwise blank screen. Worse, DOS still made it too easy for even experienced users to do dangerous things like wipe out their work by copying older versions of files onto newer ones.

DOS 4.0's file system shows directories on the left, files on the right, and options for the user in a pull-down menu.

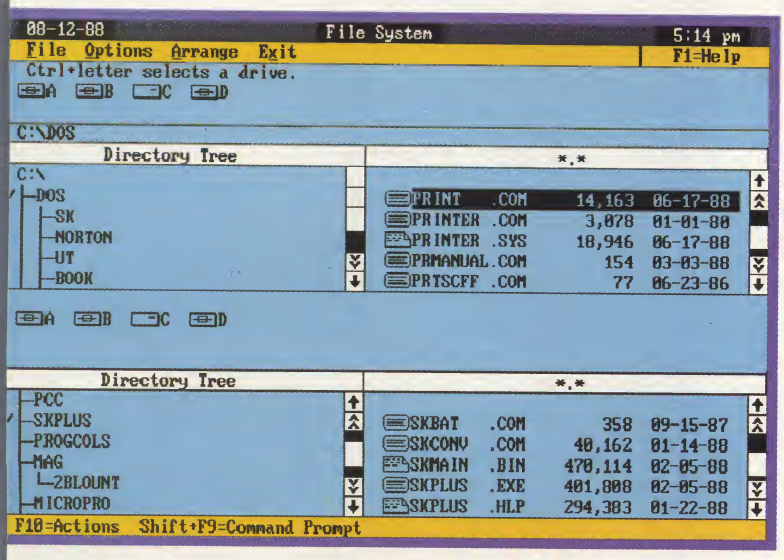
Some users relished the challenge and learned to rattle off thorny strings of DOS commands bristling with backslashes and in-

scrutable parameters like Maxtick, Timeslice, Quesiz, and Codepage. Many operated solely by applying brute force and avoided doing anything the least bit complex. Others bought special interface programs called DOS shells to step them over the rough spots, or else they gave up and bought Macs.

An August Beginning

Then, on a steamy summer afternoon in New York this year, and with almost no fanfare, IBM released a totally new incarnation of DOS called 4.0. This version comes with a DOS shell, cleverly named "DOS Shell," that tames just about every formerly nightmarish system chore.

You don't even have to worry about installing it. The DOS disks take over for you. They sniff out what kind of hardware you have and churn madly away creating system subdirectories, copying the proper files into them, and figuring out all the proper configuration settings. Users who were accustomed to running their systems with an open DOS manual beside them will suddenly be welcomed with a handsome, full-color screen that can load their applications and dispatch all their disk and file chores at the touch of a key.



You can split the File System screen to view files in different directories. The C:\DOS above the first window shows which directory is active.

This new DOS offers several other gems:

- For users who prefer to enter commands directly at the DOS prompt, it makes an effort to standardize the way DOS interprets (or "parses") what you type. And if you enter something incorrectly, it identifies the part of the command it doesn't understand.

Paul Somerson is editorial director of PC/Computing.

- While previous DOS versions let users slice enormous hard disks into smaller logical drives, each no more than 32MB in size and each with its own drive letter, DOS 4.0 smashes the 32MB barrier and lets you treat virtually any size hard disk as a single drive. To do this, however, it uses the Share command to take care of things internally. IBM warns that some applications won't be able to coexist with Share. And IBM's technique for handling immense hard disks is incompatible with Compaq's attempt to go past 32MB with its proprietary Compaq DOS 3.31.
- All DOS upgrades provide more and better system tools, and DOS 4.0 is no exception. It introduces several powerful new utilities and supercharges nearly two dozen existing commands.
- For the first time, IBM acknowledges that users often need more than 640KB of RAM. With previous editions of DOS, IBM had pretty much consigned any extra RAM to use only by its Vdisk command. But with 4.0, IBM returns to earth and supports the LIM 4.0 expanded memory spec. Of course, it warns that the new Xma2ems.sys mouthful of a LIM 4.0 driver is guaranteed to work only with IBM-brand EMS memory, but what did you expect?

(Dealing with IBM's Xma2ems.sys is not for the faint of heart. You still may have to juggle hex page frame addresses, and heaven help you if you hit a snag—the new, improved DOS manual contains eight fearsome pages titled "Resolving EMS Conflicts" that defy comprehension.)

The Shell Game

But for most exasperated or beginning users, the really important news is the DOS Shell. Once they get past the somewhat clanky installation process, they'll never again have to stare at a DOS prompt unless they really want to.

Some users really enjoy crawling under the hood and getting their hands dirty. Others can barely figure out how to start their favorite programs or copy files without tears. If the notion of an environment variable sets your teeth on edge, the DOS Shell is tailor-made for you. Its File System can simplify all your disk and file chores. And its Start Programs module can serve as a point-and-shoot menu-based applications manager.

The whole thing is based on IBM's SAA (Systems Applications Architecture) standard, which means that IBM's ergonomics engineers have combed out most of the snarls. And if you believe the hype, knowing how to use it will let you jump to any future IBM system (such as OS/2's forthcoming Presentation Manager) without skipping a beat.

The Shell does indeed make your hours at the keyboard far less intimidating. Once you learn which keys control what operations, you'll be amazed at how the File System makes it a snap to run, print,

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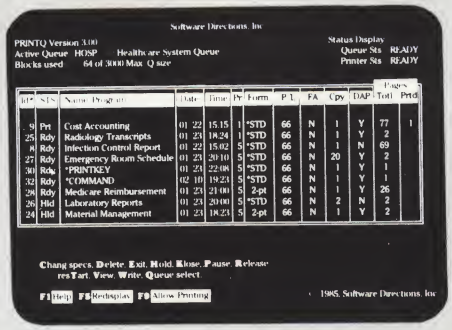

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move, copy, delete, rename, view, or sort just about anything.

Best of all, DOS 4.0 provides terse but useful context-sensitive help at every step. In many cases the onscreen help is far better than the meager assistance provided in the manuals. Just hit the F1 key and DOS *will* pop up a little window urging you along. If that particular help window doesn't solve the problem, you can tap F11 (or Alt-F1 on older keyboards) for an index of help commands.

Menus Made Easy

When the Shell first loads, it displays a main menu called Start Programs. Fresh from the factory, this screen lets you jump to one of three secondary menu screens or drop back to the DOS prompt. As with most other Shell menu operations, you can use an IBM or Microsoft mouse or the cursor keys to slide a moving bar up and down a list of choices.

At the heart of the DOS Shell is a muscular directory and file manager called the File System that you normally jump into from the Start Programs menu.

If you select Command Prompt you'll find yourself at the familiar gray-on-black C: prompt. DOS displays a message telling you to type Exit and then punch the Enter key when you're all done.

The other three options are better. One lets you switch among four preset color schemes. Another option brings up a menu of simple DOS commands; from here you can summon little pop-up boxes that help you set the time and date, compare or copy certain kinds of disks, format a disk, or back up and restore your files. The third choice switches you into the main File System.

DOS lets you create your own menus—with one or two levels called Groups, and up to 16 items on each—complete with help boxes and optional password protection. It even provides a cryptic command language of Program Startup Command options to handle the tangle of rules and parameters some applications require to load properly.

Housekeeping Made Easy

At the heart of the DOS Shell is a muscular directory and file manager called the File System that you normally jump into from the Start Programs menu.

The main screen is divided into nonoverlapping windows that display a brief command menu (the Action Bar), tell you which disks are available (the Drive Identifier), show you a graphical map of your subdirectory structure (the Directory Tree), and display selected files in whatever directory you choose (the Filename Area). Pressing the tab key scoots you from one window to another; shift-tab jumps you backwards. At any time you can hit F10 to go directly to the main Action Bar.

The Action Bar gives you four choices. Once you've selected a file—generally by tabbing to the Filename Area window, positioning the moving bar ("selection cursor") on the name of the file you want to pick, and then tapping the space bar—the Action Bar File option lets you view it (in ASCII or hexadecimal format), print, copy, rename, or erase it, or change its attribute (so it can't be erased or changed, for instance). Some of these functions also apply to directories; if you select a subdirectory, for example, then choose the Rename option, you can give that subdirectory a new name, something that DOS never allowed previously.

If the file you selected is a program, you may run it from this menu. The Shell also provides a very slick feature called Association that lets you link data files with the applications they work with. This means that you can tell the Shell that one text file is in a WordStar format, another in WordPerfect; once you've made the association, by specifying which extensions correspond with which programs, you can position the moving bar over the data file, press Enter, and have the Shell first start the appropriate application and then load in the data file you picked.

The File option on the Action Bar also lets you create new subdirectories, or select or deselect the entire slate of files en masse. It even lets you move files from one disk or directory to another in one step, without having to copy them first and then go back to delete the originals.

The Action Bar's Options menu controls what shows up in the Filename Area. The default displays all files and sorts them alphabetically in name order. If you want to list just the filenames with .txt extensions you can specify that with this menu, and you can rearrange the list in order of extension, date, or size, or you can have them displayed in the order in which they actually appear on the disk.

The Shell automatically asks you to confirm your action if you try to delete a file. Similarly, if you try to copy or move a file to another directory or disk that already contains a file with the same name, it won't let you proceed without confirmation. You may override such protection temporarily, however, by toggling off the confirmation features in the Action Bar's Options menu. This menu also lets you select files from different directories or disks in one gulp, but the process is overly complex.

The final Options menu choice displays vital information on how many directories are on your disk, how many files each contains, how much space they take up, how many files you've currently selected, and the attributes of the most recently selected file.

The Action Bar's Arrange menu lets you either

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view one disk or directory at a time, or split the screen in half and work with two at once. It also allows you to lump together every file in every directory on a specified disk and display the filenames in one long list in the Filename Area window. This is handy for uncovering clutter such as duplicate files or different versions of the same file in different directories. When you move the highlighted bar down the systemwide list, the Shell uses a small window called the Path Area to display the directory each highlighted file comes from.

You can adapt this technique to locate a file you've misplaced. Just enter the missing filename in the Options/File Options/Name box, then select the Arrange/System File List option. The Shell will track down every copy of the file on the specified disk with the name or wildcard file spec that you entered.

One final menu lets you exit, but you can generally quit from wherever you happen to be by pounding on the Esc key until the Shell beeps at you and then pressing F3 once or twice.

Getting Control

You may run the shell in text or graphics mode. The installation program, called Select, will rummage through your system and set things up to take advantage of the highest video mode it thinks your hardware can handle. Either mode can work with a mouse or keyboard, or both. The default is an IBM mouse, but the system also has drivers for Microsoft mice.

You can tell the Shell to run in resident or transient mode. If you're using a hard disk system, opting for transient mode will use memory more sparingly, since the Shell will hunt for what it needs on the disk. If you (gasp) are running the Shell from floppies, selecting resident mode will keep the thing permanently in RAM so you can remove the disk that contains your Shell files.

Documentation Woes

Nobody has ever liked a DOS manual, and users aren't going to take the relatively skinny *Using DOS 4.0* with them on vacation instead of a Tom Wolfe or Robert Ludlum novel. Nevertheless, the new manual takes a small step in the right direction (though the organization is a trifle arbitrary). Instead of tossing out terms and then trying to define them as was done in previous editions, it offers choices of actions you can take and follows these with appropriate command examples. It also provides similarly arbitrary definition tables at the rear, with short and snappy explanations of what everything does.

A spiral-bound companion booklet, *Getting Started with DOS 4.0,* delves into the mysteries of disk parti-

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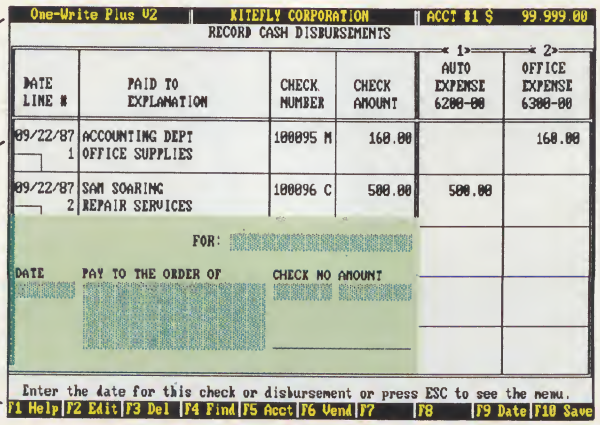

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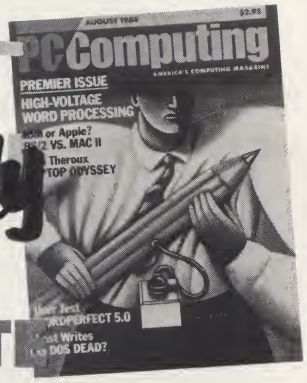

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tioning, general system installation and background information, and the workings of the new shell.

You can also plunk down an extra $30 for *Command Reference,* a separate spiral-bound book. This manual is a must for any serious user and really should be given away free. Although it duplicates some of the information in other manuals, it provides a treasury of vital DOS arcana, with exhaustive slates of examples, dozens of handy little tables, and great dollops of random DOS lore. It also introduces a totally new kind of structured DOS syntax diagram that lets you plow through the maze of optional and required parameters with relative ease.

Command Reference is required reading if you want a good explanation of how ANSI works. DOS was originally written as a TTY (short for teletype) operating system that could work on only one line at a time in one color on a black background. DOS 2.0 introduced Ansi.sys, which gave the user more control. With it you can remap your keyboard and have DOS print text anywhere on your screen and in any color, but few users take advantage of Ansi.sys since it has never been explained very well.

This new release adds terrific utilities. And you'll definitely need it if you own a monster hard disk that you don't want to chop into smaller logical drives.

Unfortunately, many of the finer points of the basic Shell operation are glossed over or even ignored in all the manuals. Fortunately, the onscreen help fills in most gaps. Users may find themselves juggling the familiar slipcased *Using DOS 4.0* along with *Getting Started* and the optional *Command Reference* to ferret out some of the more elusive information about DOS 4.0; valuable data is contained in all three. Whoever organized these manuals and divvied up the information had a perverse sense of humor.

DOS Lives

The cost of all this magic is $150, although current DOS users can upgrade for $95. Of course, you pay another price for so much extra muscle. Adding the necessary system files to a 360KB floppy takes up over 100KB of space—one-third more than the same files took up under DOS 3.3. Worse, the raw DOS files eat up nearly 64KB of precious RAM. By the time you start adding your usual DOS device drivers, buffers, and other configuration files, you may not have enough RAM left to run all your favorite memory-hogging applications.

Still, this new release adds terrific utilities. And you'll definitely need it if you own a monster hard disk that you don't want to chop into smaller logical

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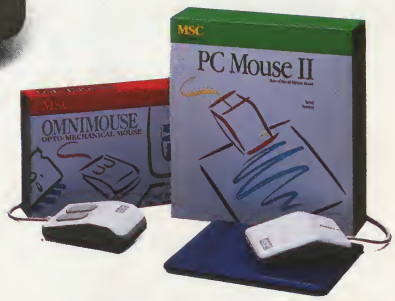

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drives. The DOS Shell is a boon to individuals who hate the C: prompt, as well as to corporate MIS departments that set up simple menu systems for lots of novices and casual users. You can buy faster and sexier DOS shells and menu systems, but not with the IBM logo or the future hooks into other SAA products. And besides, the DOS Shell can do some very powerful tricks of its own and will easily satisfy the needs of the vast majority of users.

The most eyebrow-raising fact: DOS 4.0 was cobbled together by the programming wizards at IBM. You're not alone if you're asking, "Programming wizards . . . at IBM?"

Many experienced users caution against purchasing any DOS product with a ".0" in the version number, since this indicates a major revision in the code. It's impossible for IBM to test fully how the code will interact with the millions of mongrel configurations in the field, and some users will inevitably find features in this new DOS that don't work properly. As of this writing, Microsoft still hadn't released its generic version, although one is expected shortly. Our tests didn't uncover any serious problems other than severe organizational shortcomings in the manuals, a little foot-dragging in places, and a few operations that required too many steps.

The most eyebrow-raising fact about all this is that it was cobbled together by the programming wizards at IBM. You're not alone if you're asking, "Programming wizards . . . at IBM? Isn't that a contradiction in terms? Aren't these the same people who brought us TopView and DisplayWrite and a lot of forgettable accounting software ported from obsolete minicomputers?"

Well, yes. But several years ago IBM decided to claw its way out of the software doghouse, and it's been on a roll since. One of the best DOS utilities ever, Xcopy, was hammered together by an IBM software team for Version 3.2. And the company you love to hate has spent the past year and a half polishing the performance of the operating system you also love to hate.

This powerful new Version 4.0 indicates loud and clear that DOS is far from dead. And it also hints that IBM's software effort is no longer the laughingstock of the industry—although its documentation department, while improving slightly, could still use some serious help. If you want to push your IBM-logo hardware to the limit, or dispatch ugly DOS tasks with a minimum of fuss, grab it. ◪

Next month: DOS 4.0's new, more powerful commands.

Just a few months ago, computers this powerful were tracking planetary movements, pondering quantum physics and building rockets.

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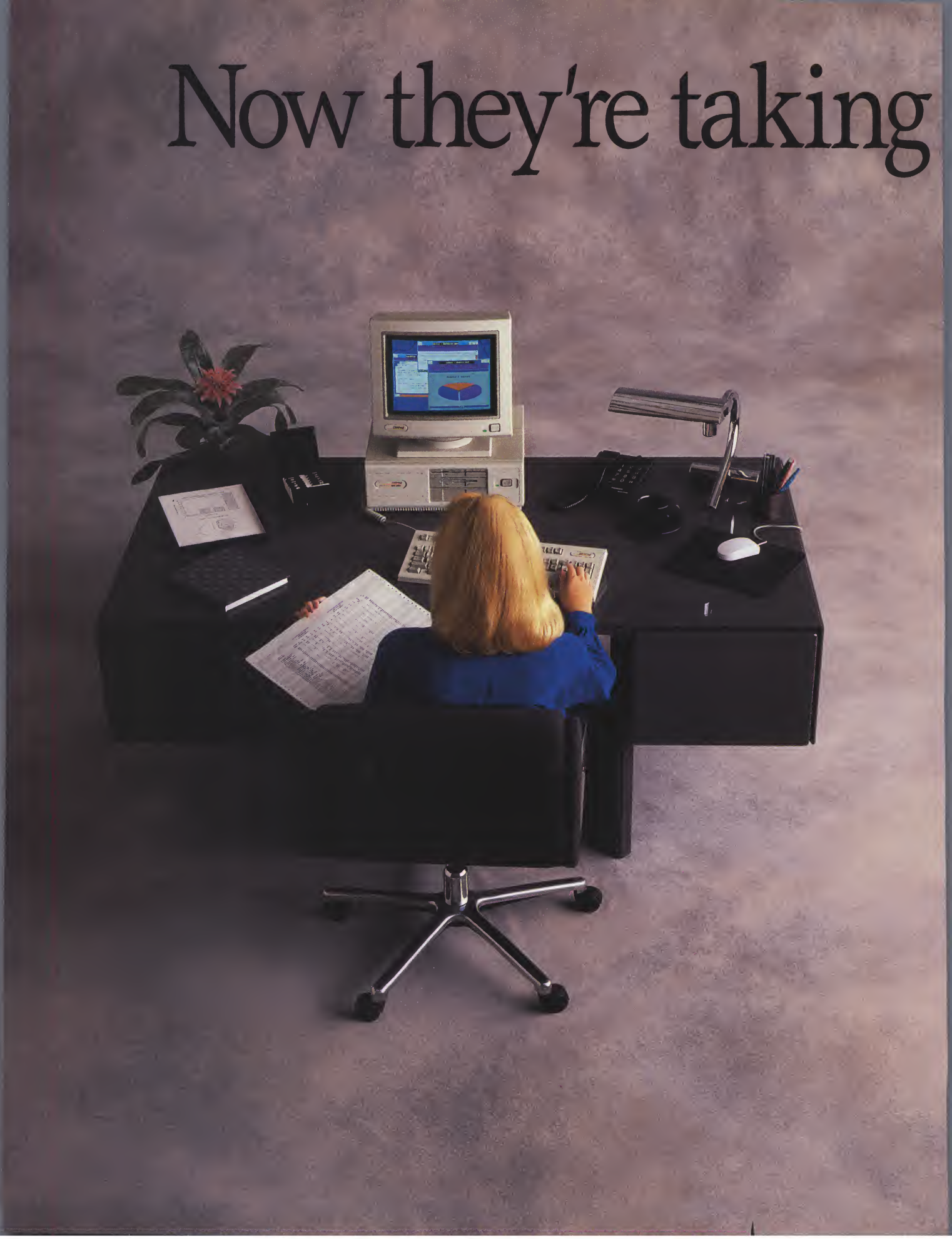

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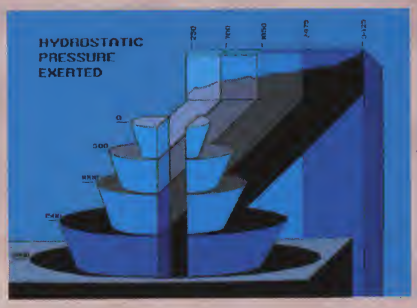

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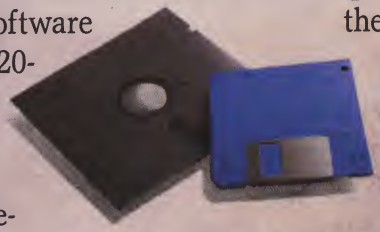

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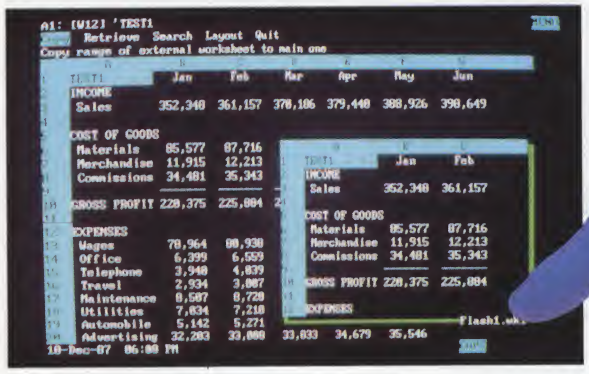

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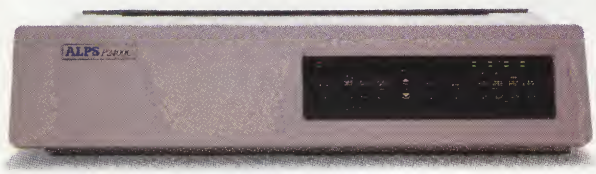

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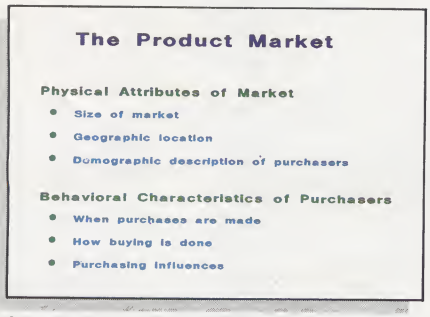

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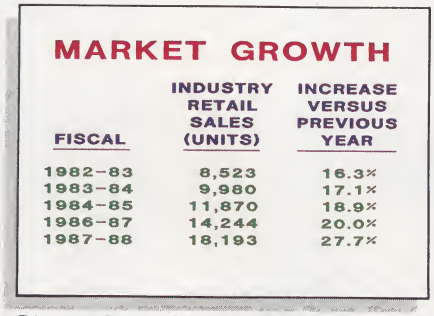

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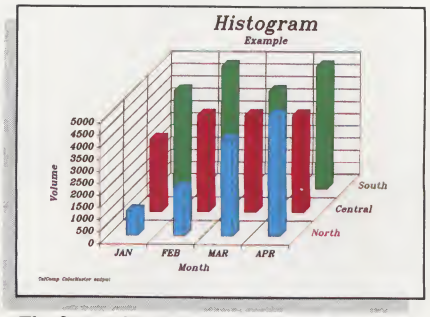

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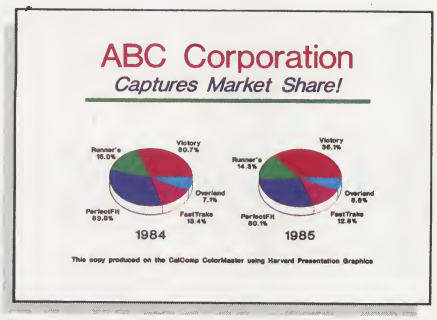

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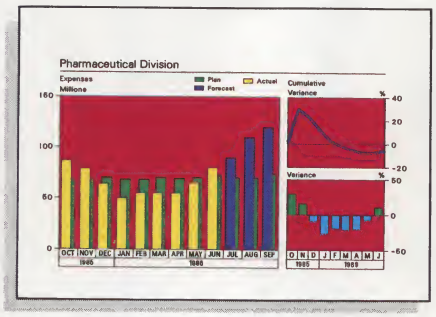

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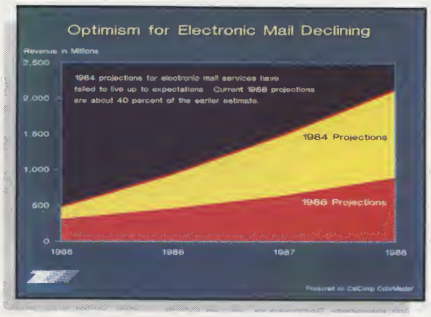

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Three Dream Systems

State-of-the-art setups for PC power users.

By JIM SEYMOUR

Photography by DANA SIGALL

THE ultimate personal computer systems—few of us can afford them. As much as we dream of 25MHz 386s, huge color monitors, and high-speed laser printers, most of us plod along with far more modest equipment. That doesn't mean we don't dream those dreams. And it doesn't mean there aren't real business applications for those optimum systems. *PC/Computing*'s picks for the best of the best are three great computer setups for presentation graphics, desktop publishing, and CADD. All three illustrate particularly well how far PCs have come in the graphics world over the past few years. Our choices run rings around many of the mainframe computers of a decade ago. In fact, for the kinds of applications we've chosen, they run rings around *any* other systems available today. PCs can be far better and more responsive tools than dumb graphics terminals (or even smart workstations) connected to minicomputers and mainframes, especially for interactive work of the sort required by these three broad applications. So indulge your fantasies with our three state-of-the-art approaches to PC power.

Presentation Graphics

PC GRAPHICS have come a long way since you showed the guy at the next desk those early, ugly 1-2-3 bar graphs in pink, blue, and off-white on your equally early and ugly IBM CGA-standard monitor. Today we use PCs to create business graphics of all sorts, from bar graphs and pie charts to bulleted lists and organization charts. And today's PC graphics not only stand up to those created on any size system, at any price, they're often far better.

Sometimes those PC-created graphic images are reproduced in crisp black and white on desktop laser printers. Sometimes they're printed on high-resolution, long-palette color thermal printers. And sometimes they're organized into "slide shows" to be displayed on a PC monitor or projected from a computer-driven video system.

Compaq's powerful Deskpro 386/25—the fastest generally available PC around today—is at the heart of our "best of the best" graphics system. Our Deskpro 386 is also equipped with a Weitek math coprocessor chip for extra speed. Though higher-resolution displays are available and sometimes necessary, we opted to stay with the widely supported IBM VGA standard, with images from Compaq's speedy video graphics controller board displayed on a 19-inch Definition 1019/SP color monitor from Microvitec.

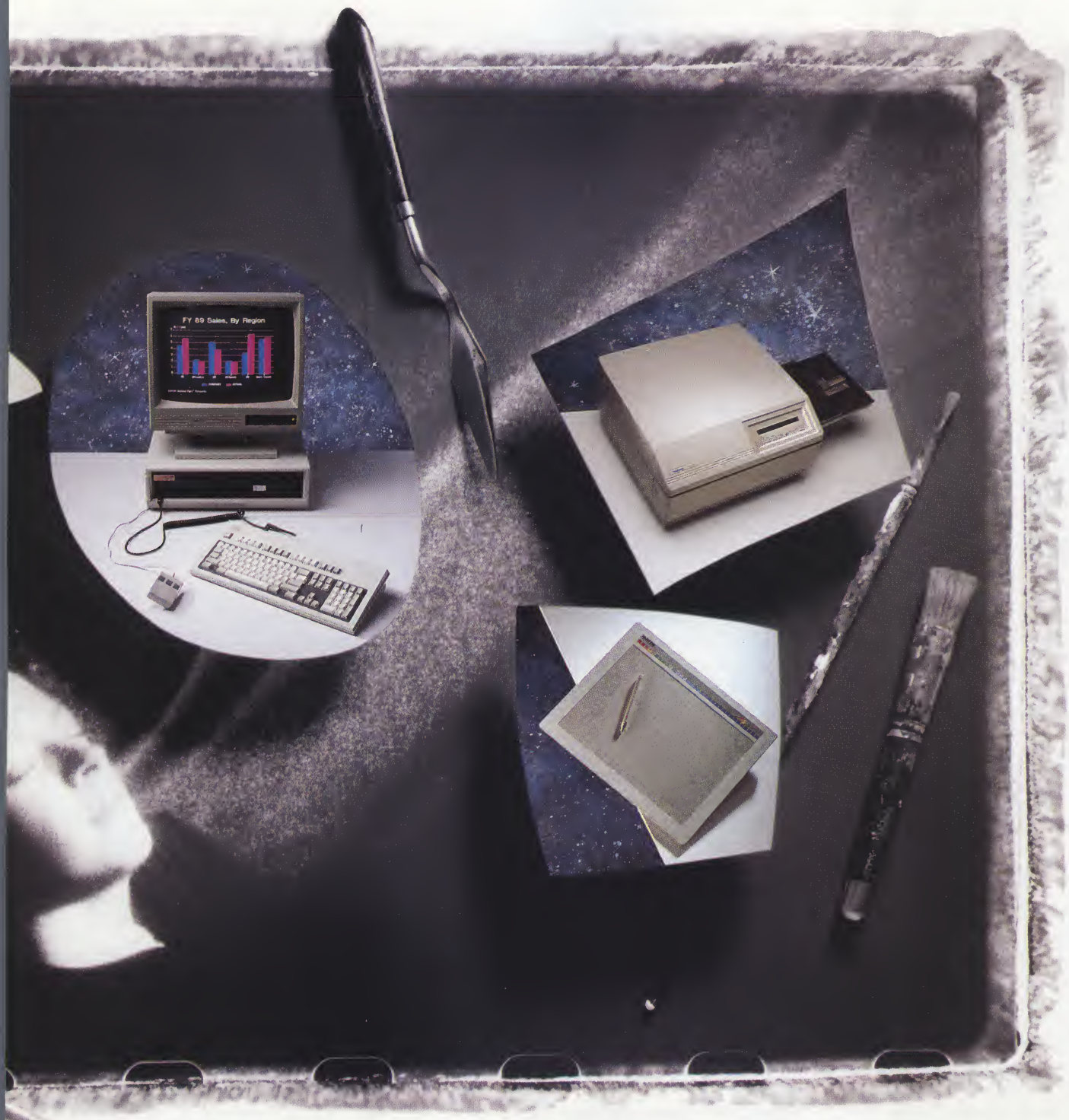
Harvard Graphics from Software Publishing has become the best and the best-known business graphics package in the PC world by offering the right mix of chart types, output-device support, and ease of use. Harvard knows enough about how attractive business charts and graphs should look that it tries to save users from ugly, eccentric designs and type styles.

Input comes from the Compaq's 101-key keyboard, from a Logitech HiREZ mouse, or from the cordless stylus of Kurta's 12-by-17-inch IS/ONE digitizing tablet.

For output, our system of choice can make high-quality, 4,000-line-per-inch 35mm slides on a Matrix PCR film recorder, or produce 300-by-300-dot-per-inch paper printouts on an Apple LaserWriter II NTX (in black and white) or on the new Tektronix Color Image Printer 4693D. And if you want to create a computerized slide show of your graphics, General Parametrics' VideoShow system can put your images on a screen, in the sequence and with the intervals between slides that you prefer. The entire system lists for $60,826, still a bargain given the savings in out-of-house production costs it will bring.

Computers can't make you an artist, but systems like this one can help even the least artistic PC user prepare effective, memorable presentations.

Jim Seymour is editor-in-chief of PC/Computing.



Compaq Deskpro 386/25, $17,495; Weitek 3167 coprocessing chip, $2,599; Microvitec Definition 1019/SP monitor, $2,559; Logitech HiREZ mouse, $149; Kurta IS/ONE digitizing tablet, $1,045; Apple LaserWriter II NTX, $6,599; Matrix PCR film recorder, $11,795; Tektronix Color Image Printer 4693D, $13,495; VideoShow 160, $4,595; Harvard Graphics 2.1 software, $495.

Desktop Publishing

GIVE IT TO Apple: Desktop publishing may have been begun by the folks at Interleaf, or Xerox before them, but Apple and Aldus made it a reality. And the key ingredient was the Macintosh.

You can buy Aldus's PageMaker software for MS-DOS PCs, but you'll find it a slower, clumsier, less effective route—no matter how zippy the underlying DOS hardware—than PageMaker on the Mac. Personal-computer-based desktop publishing began on the Mac, and despite the efforts of IBM, Aldus, Xerox's Ventura development group, and others, it's still a game best played on the Mac.

The best desktop publishing system is built around the Macintosh II, Apple's current top-of-the-line model. Equip it with 8MB of memory, Apple's MultiFinder operating system, and a fast, 328MB Priam external hard disk, and you've got a system with the speed and capacity to handle large and complex publications.

For effective page design, you've got to be able to *see* what you're designing. Putting those pages up on a SuperMac Technologies 19-inch Trinitron display, driven by SuperMac's Spectrum 8 video card, makes that easy. A second, standard Apple RGB monitor and an Apple video board let you move PageMaker's tear-off menu to the second screen, where it remains in view without blocking the image of the pages. That second display also allows previewing or modifying images and text in other programs (running, of course, under MultiFinder) before you move those images and text blocks into your finished pages.

With the range of fonts available from Adobe Systems, your desktop publications won't be dull. These downloadable "soft fonts" follow the PostScript conventions, so you can easily scale, rotate, or otherwise adjust them to fit the printed page. About a dozen fonts should round out the typographic toolkit; we like American Typewriter, ITC Machine, Helvetica Condensed, Helvetica Black, Franklin Gothic, and Glypha, among others.

Documents look even more professional when you scan in artwork and photographs. Hewlett-Packard's ScanJet became the quality leader in desktop scanners the moment it was released last winter; now, with its brand-new Macintosh interface, it becomes the scanner of choice for an optimal Mac publishing system.

Output goes to—what else?—an Apple LaserWriter II NTX, the current high-end model in Apple's pioneering LaserWriter series. With 11 fonts built in, plus the new Canon CX print engine for better blacks, and much better paper-handling capabilities than its predecessors, the NTX is the machine of choice. Wealthy desktop publishers can fill the printer with up to 12MB of RAM and even add the printer's own SCSI-interface hard disk for storing type fonts without cluttering up the Mac II's hard disk subsystem.

This system will set you back exactly $27,143.90 at list prices—or about $20,000 at typical street prices. That's a long way from the egalitarian view of desktop publishing—some like to recall journalism critic A.J. Liebling's remark that "freedom of the press belongs to those who own one"—but you'd be hard-pressed to find a better, faster, more capable system for anything approaching that price.

Macintosh II, $4,800; SuperMac 19-inch Trinitron monitor with Spectrum 8 color card, $5,795; Hewlett-Packard ScanJet desktop scanner, $1,495; Hewlett-Packard Macintosh interface kit, $495; Priam EM330 SCSI hard disk, $3,995; Apple LaserWriter II NTX, $6,599; Macintosh II monitor cable extension kit, $49.95; ADB extra-long keyboard cable, $39.95; Aldus PageMaker 3.0, $595; twelve fonts from the Adobe Type Library, $2,685; OCR Systems ReadRight OCR software, $595.

CADD

PERSONAL computers have pushed the computer-aided design and drafting revolution out of the austere "computer rooms" of the very largest architectural and engineering firms—once filled with fancy boxes from Intergraph, Computervision, and IBM—and into the very smallest shops.

When CADD required systems costing $100,000 and up, plus full-time minicomputer-trained support people, only the biggest design jobs went onto the computer. Today powerful, cost-effective PC CADD systems mean that CADD makes sense on almost any design project.

Our system is built around Sun Microsystems' new 386i Model 250 computer. The 386i combines the Intel 80386 microprocessor with the power of Sun's non-DOS Unix workstations. You can run multiple DOS programs simultaneously in the 386i's 4MB of RAM under Sun's proprietary, Unix-based operating system. And power is the key to effective PC CADD because the computation required to recalculate vectors and sizes and resize elements in a drawing demands all the computing muscle you can afford.

Autodesk's AutoCAD and AutoShade programs represent the best of the high-end, full-feature PC CADD software. Both support the Sun 386i's high-resolution (1,152 by 900 pixels) 19-inch color display.

Though someday large electrostatic plotters will become affordable enough to begin to replace pen plotters in PC CADD systems, today the D- and E-size drawings that architects and engineers require invariably roll out of pen plotters. Hewlett-Packard's $3,995 DraftPro offers the quality and features of plotters that sell for twice as much.

Input in CADD systems comes from the keyboard, from a digitizing tablet, and sometimes from a mouse. Our system adds to Sun's mouse a 12-by-18-inch Calcomp tablet, with stylus and four-button puck.

Throw in a Quadram Microfazer II buffer to manage spooling those drawings to the plotter, and you have an incredibly good state-of-the-art CADD system. Total cost: $30,955.

Sun 386i Model 250, $21,990; Calcomp 23180 digitizing tablet, $1,095; Quadram Microfazer II buffer, $375; Hewlett-Packard DraftPro 7570A plotter, $3,995; Autodesk AutoCAD, $3,000; Autodesk AutoShade, $500.

Why you should care what a Big Eight accounting firm, a $12 billion bank holding company, PC Week, and Michel Guibord of Orleans, Ontario have to say about @BASE for 1-2-3.

You should care because they've discovered a not-so-obvious fact about database add-ins: When you put a real database into 1-2-3 you get capabilities that high-priced stand-alone database managers can't match.

And they discovered that one database add-in stands head-and-shoulders above the rest. @BASE* is superior.

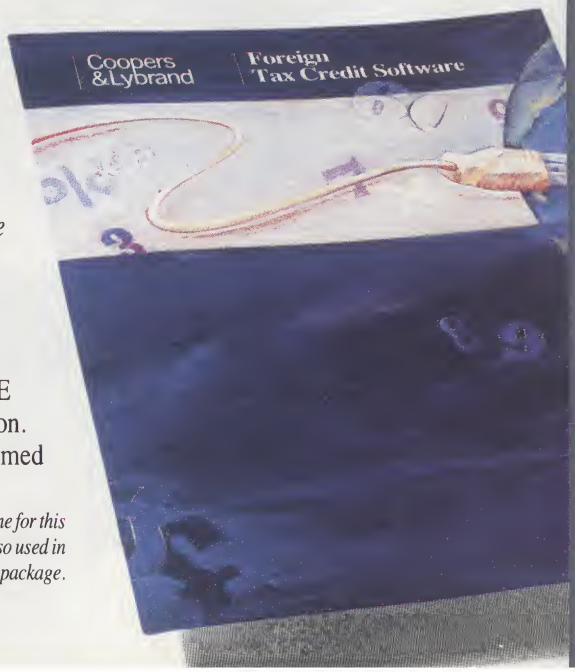
@BASE™ and 1-2-3®
work together to
solve business problems.

Coopers & Lybrand, a Big Eight accounting firm, was faced with a challenge. They needed to build a sophisticated tax application that could crunch lots of data and would also be easy to use.

"We started with 1-2-3 because it's very powerful and our clients already know how to use it. We turned to database add-ins for disk-based data storage and discovered that the capability of 1-2-3 is greatly magnified when access to data is unlimited".

C&L took a close look at @BASE before designing it into their application. It performed well in all three areas deemed

*(pronounced "at base")



Coopers & Lybrand chose @BASE as the engine for this powerful tax application. @BASE is also used in C&L's K-1 Partnership package.

crucial to the success of their project. First, @BASE was very fast in benchmark tests. Second, it was judged excellent for ease-of-use and ease-of-development. Third, it was found to be highly efficient in memory usage. C&L's conclusion: "*@BASE is a very good product. It really does the job*".

A $12 billion bank holding company chose @BASE over other database add-ins for use throughout their banking system. Why?

"Our people are 1-2-3 users, not programmers. @BASE blends beautifully with 1-2-3, much better than the other products we looked at. @BASE is smaller and faster and our users pick up on it right away".

They also preferred @BASE for its compatibility with dBASE III Plus. *"@BASE lets our 1-2-3 users get at data stored in dBASE files*". Some products can import and convert dBASE files but @BASE is the only leading database add-in that reads and writes dBASE files directly.

Rave reviews.

You may not have time to perform your own evaluation. So check the reviews.

"The best of both worlds. @BASE is almost like having dBASE tamed and tailored for your worksheet". – PC World

"By far the most powerful dBASE-related add-in". – Personal Computing

"I could go on and on talking about the power of @BASE. Personics has changed the way 1-2-3 will be used from now on". – PCM

Fan mail.

Many @BASE owners write comments on their registration cards. Here's what some of them had to say:

"@BASE is the best documented and easiest to use database add-in I've seen. Better than others we looked at. Clear, concise, complete". – Michel Guibord, Orleans, Ontario

"The best database I've ever used. Easy but still very powerful. Love it and thanks". – M. I., Fort Worth, TX

"Exactly what I need. Looks like someone has really done their homework". – J. Y., San Diego, CA

"Used @BASE at the office and I had to have it at home. Great job". – A. D., Lake Forest, IL

"Best Lotus add-in I've seen yet. Money well-spent". – J. P., Chicago, IL

Database Add-In for 1-2-3 Has More Capabilities Than Rivals

The king of the crowded forest of Lotus 1-2-3 database add-ins is unquestionably @BASE . . .

@BASE was developed by Personics, maker of the popular SeeMORE utilities . . .

With @BASE, it's possible to build colossal 32 M-byte databases in the standard dBASE III Plus format without ever using dBASE itself. Users can convert a normal 1-2-3 database instantly into a dBASE-compatible file, as well as set up dynamic links that will import updated information from dBASE records every time a worksheet is recalculated.

A database can be sorted alphabetically, numerically or chronologically on as many as 128 levels. In fact, @BASE will pack and sort records as much as three times faster than dBASE . . .

Data can be analyzed to provide lightning-fast reports in response to such questions as: "What sales people in each division earned more than $20,000 in commissions this month?"

In addition, records can be entered or examined in a form view, where each record occupies an individual screen. Alternatively, of course, the user can choose the usual one-record-to-a-line format.

We tested the current $195 release of @BASE along with the Option Pac which retails for $89.95. **Together, these two relatively inexpensive products provide truly remarkable functionality.**

In addition to the indexing feature, the Option Pac will join files to make relational databases, create computed or derived fields, sort a database without rearranging the records on disk, and automatically keep files in the correct sorting order during record entry or updating.

The 200-page manual for @BASE is excellent . . . **For those who use both dBASE and Lotus 1-2-3, @BASE is practically a requirement. A superior product in every respect.**

EXCERPT FROM PC WEEK REVIEW MARCH 8, 1988. USED WITH PERMISSION.

@BASE is the best database add-in and also the smallest. A contradiction? Not really. It was developed by one of the Principal Engineers at Lotus behind 1-2-3 Release 2.

	@BASE	Silverado™	Oracle™ for 1-2-3	Informix™ Datasheet
Ease-of-Use	✓			
Ease-of-Development	✓			
Performance	✓			
dBASE Compatibility	✓			
Memory Conservation	✓			
Minimum Memory Requirement	78K	174K	250K plus 1MB Extended	300K

Growth path.

@BASE is simple to use, compact and extremely powerful. And if you want to develop relational database applications, you can get the @ BASE Option Pac to add "join" capability and support for multiple indexes. In the future, as new releases of 1-2-3 and dBASE become available, compatible versions of @ BASE will follow.

We guarantee you'll like it.

We invite you to try @BASE. If you don't like it for any reason you'll get your money back. @BASE is available through leading software resellers and directly from Personics. Clip the coupon below or call toll-free. We also accept company purchase orders by mail or by fax. @BASE works with 1-2-3 Release 2 on the IBM PC, XT, AT, PS/2 and compatibles.

@BASE is from the makers of SeeMORE™, SmartNotes™, LOOK&LINK™ and UltraVision™.

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Discount EGGHEAD SOFTWARE

1-2-3 is a registered trademark of Lotus Development Corporation.

@BASE™

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Please send me:
____ copies of @BASE at $195 each.
____ copies of the Option Pac at $89.95 each.
Include $3.75 shipping per order. ($12 outside USA and Canada.) Mass. residents add 5% sales tax.

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Attention to Detail

OR

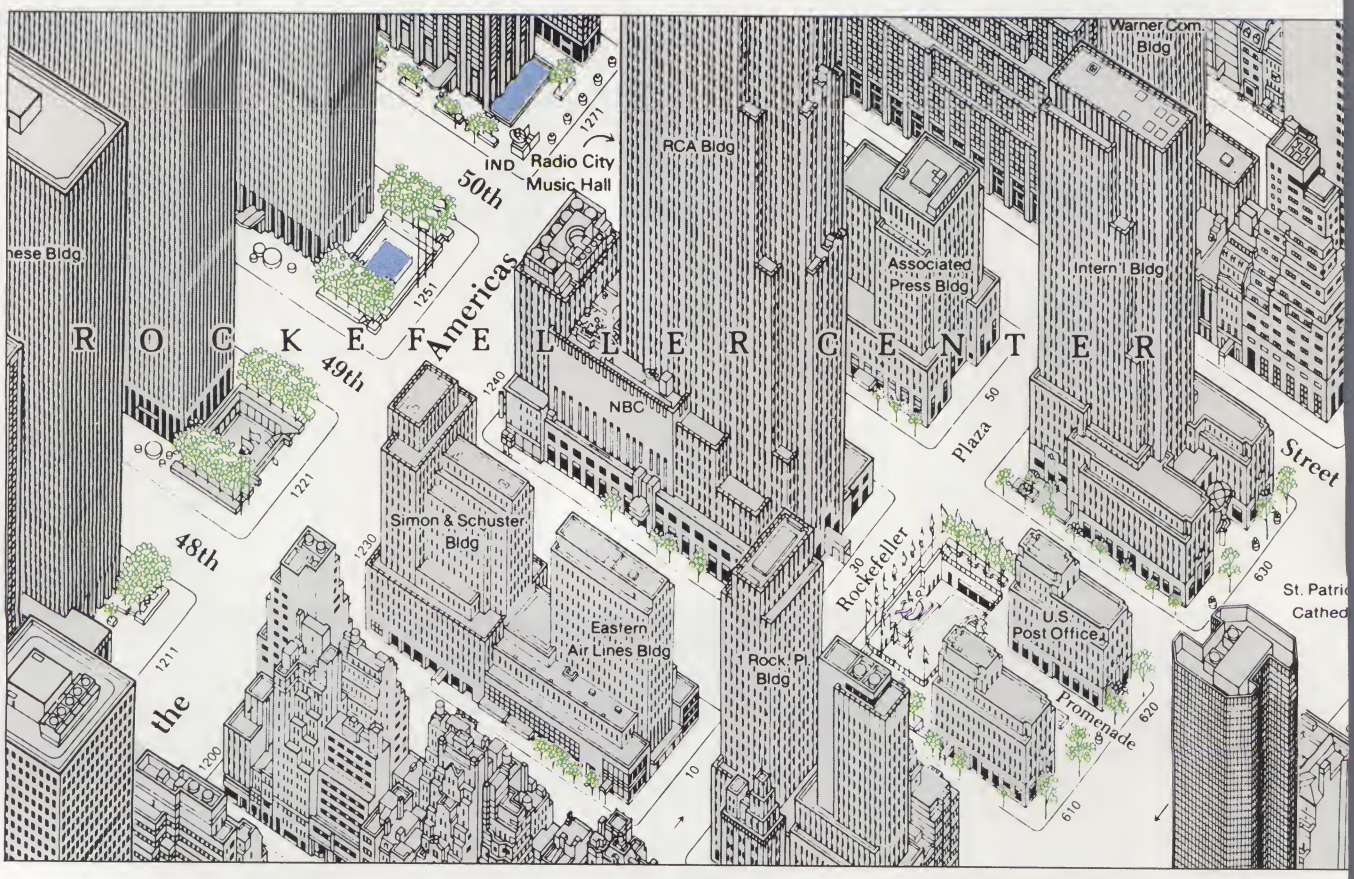
Less Is a Bore

Detail is often the staunchest ally of clarity. By EDWARD TUFTE

For 20 years Constantine Anderson refined his elegant axonometric projection of midtown Manhattan, following in the long tradition of bird's-eye maps, a tradition exemplified by the 1749 Bretez-Turgot *Plan de Paris.*

The map embraces such fine points as individual windows, subway stations and bus shelters, telephone booths, building canopies, trees, and sidewalk planters. The typography is also energetically thorough; the full map (which measures 23 by 36 inches) reports 1,686 names of buildings, stores, and parks, along with 657 specific street addresses—resulting in an abundant typographic density of some 20 characters per square inch. The sole concession to paper flatland is that streets are drawn extra wide, to reveal the buildings more fully.

The Manhattan map and the *Plan de Paris,* and even standard road maps, illustrate the poverty of information that can be displayed on our computer monitors, which show only a few thousand characters or, on a very good day, a million bits. Yet a single United States Geological Survey quadrangle sheet contains 150 million bits. Or consider *The Mobil Travel Guide,* which prints an average of over 12,000 characters on a single page. Telephone books run 15,000 to 18,000 characters per page. And *Who's Who in America* records the careers of its heroes and heroines with 28,000 rather microscopic characters



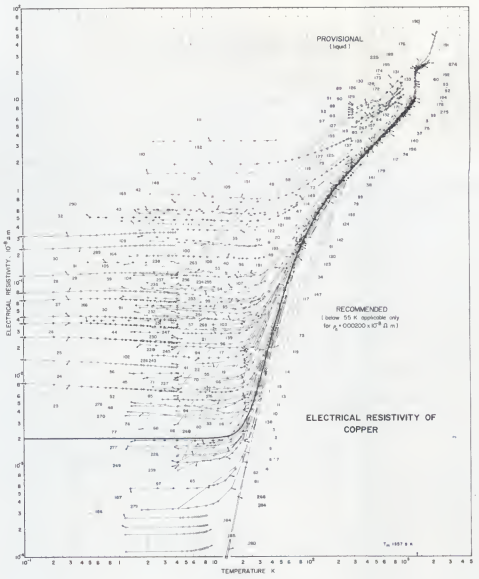
COPYRIGHT THE MANHATTAN MAP COMPANY

per page, an intolerable typographic density for a long read, such as a novel, but just fine for a reference book.

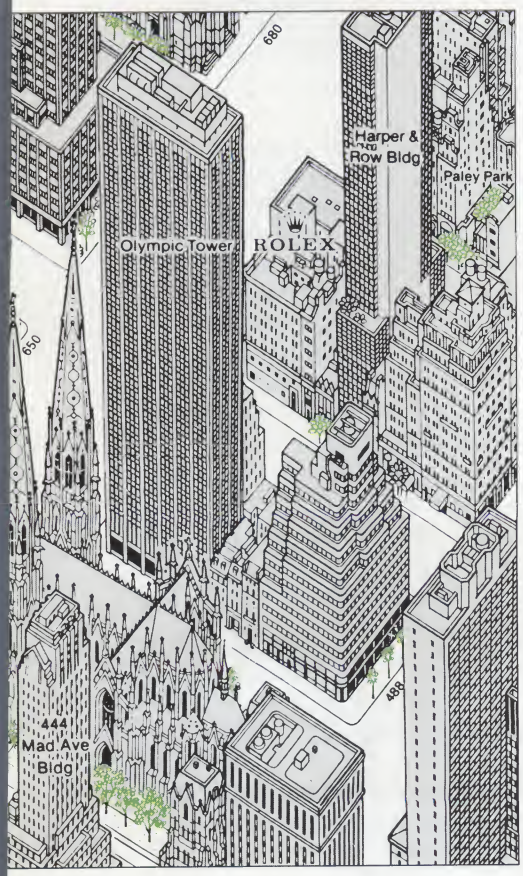
Anderson's high-density New York map demonstrates a powerful idea for enhancing data displays, an idea quite contrary to conventional wisdom. The texture of exquisite detail in the map leads to personal *micro-readings,* specific stories about the data: shops visited, hotels stayed at, walks taken, office windows looked through—all in the elaborate context of an entire building, street, and neighborhood. Detail then cumulates into larger coherent structures. All those tiny windows, when read at a distance, gray into surfaces of an entire building, yielding a second level of perception—a more distant *macro-view*. Simplicity of reading derives here from complex information, properly arranged. A most contrary design strategy is thus revealed: *to clarify, add detail.*

This strategy has endless implications for how we envision information on paper and on the computer screen. The general practice is to posterize, to simplify, to use lots of "friendly" empty space. Contrast the rich information texture of the New York and Paris maps with the design-elaborate and data-impoverished displays of computer graphics.

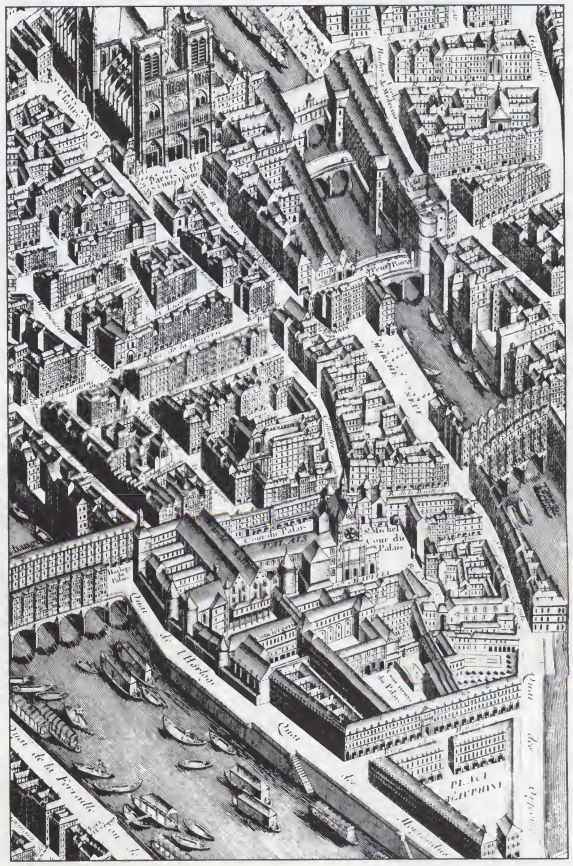
We can see the power of detail in some additional examples.



THE MULTILAYERED GRAPH of the electrical resistivity of copper reports the clouded relationship between temperature and conductivity for copper, as assessed by many different laboratories. Each set of connected points comes from a single publication, cited by an identification number.



Constantine Anderson's elegant axonometric projection of midtown Manhattan (left) follows in the tradition of the 1749 Bretez-Turgot *Plan de Paris* (right). The full map measures 23 by 36 inches and reports 1,686 names of buildings, stores, and parks, along with 657 specific street addresses.



COURTESY OF THE BEINECKE RARE BOOK AND MANUSCRIPT LIBRARY, YALE UNIVERSITY

Note how deftly the display organizes the material, recording data from hundreds of studies and also enforcing comparisons among remarkably divergent results scattered around the correct curve, a solid line labeled "Recommended." Three layers of data are in micro/macro evidence—individual points measured within each study, connected curves formed by those results, and an overall conglomeration of curves.

What credibility the chart has. The diagram makes it clear that someone went and dug out hundreds of studies and persistently recorded all the results. From detail, credibility grows.

A similar micro/macro composition governs the famous 1930 poster by the Soviet graphic artist Gustav Klutsis, in which design and political point correspond: from the work of many hands, one great plan will be fulfilled.

At work in micro/macro displays is a rich and powerful principle of information design. Panorama, vista, and prospect deliver to viewers the freedom of choice that derives from an overview, a capacity to compare and sort through detail. And the micro-information, like smaller texture in landscape perception, offers a credible refuge where the pace of visualization is condensed, slowed, and personalized.

The effectiveness of micro/macro displays is universal, rooted in human information-processing capacities and experienced in the richness of our everyday perceptions. The human eye picks up 150 million bits at a glance. Consequently, the power of micro/macro designs holds for all types of data displays, even computer screens. Micro/macro arrangements can carry immense detail, organizing complexity through multiple and sometimes hierarchical layers of contextual reading.

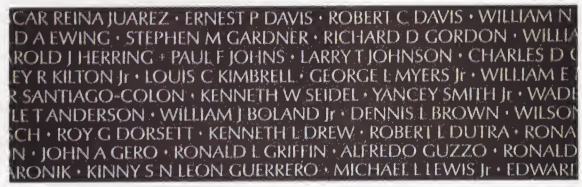
THE VIETNAM VETERANS Memorial in Washington, D.C., achieves its visual and emotional power by means of micro/macro design. From a distance the entire collection of the names of 58,000 dead soldiers arrayed on the black granite yields a visual measure of what 58,000 means, as the letters of each name blur into a gray shape, adding to the impact of the final toll. As a viewer approaches, these shapes resolve into individual names. Some of the living seek a name of one soldier for personal micro-reading; more than a few visitors touch the etched, textured names. We focus on the tragic information; absent are a big portico, stairs, and other marble paraphernalia usually attached to official monuments.

As we walk on a slight grade downward (approaching from either side), our first close reading is of panels no higher than a few names. But looking forward, we see names of the dead rising higher and higher, a macro-statistical blur of marks in the distance with micro-detail at hand. Context is enlarged by reflections off the polished black granite, reflections of the living and of trees, and, at a distance, the Lincoln and Washington memorials.

Edward Tufte, who was a design consultant on the user interface for IBM's OS/2 Presentation Manager, teaches at Yale University. His books include The Visual Display of Quantitative Information *(Graphics Press, 1983) and* Envisioning Information, *to be published next year by Graphics Press.*

PHOTOGRAPH BY ARTHUR GRACE/TIME MAGAZINE

PHOTOGRAPH BY DAVID M. DOODY



NAME	RANK	SVC.	DATE OF BIRTH	DATE OF CASUALTY	CITY	STATE	MIA	PANEL NO.	LINE NO.
SMITH ROBERT GEORGE	PFC	AR	11 JUN 45	02 JAN 66	CLEVELAND	OH		4E	52
SMITH ROBERT HAROLD	SP4	AR	27 OCT 46	24 JAN 67	WARMINSTER	PA		14E	73
SMITH ROBERT JAMES	SSGT	AR	16 DEC 45	18 APR 68	ALBANY	NY		50E	41
SMITH ROBERT JEREMIAH	CPL	AR	16 MAY 47	29 SEP 67	BUFFALO	NY		27E	32
SMITH ROBERT JOE	SP4	AR	04 JUL 44	21 MAR 67	JACKSONVILLE	FL		17E	14
SMITH ROBERT JOHN	A1C	AF	15 OCT 42	25 JUN 65	SCARBORO	ME		2E	19
SMITH ROBERT JOSEPH	PFC	MC	04 AUG 48	26 AUG 68	COLUMBUS	GA		46W	34
SMITH ROBERT JR	PFC	AR	20 MAR 45	26 MAY 66	PHILADELPHIA	PA		7E	111
SMITH ROBERT L	SGT	AR	30 JUN 37	25 AUG 66	MILLINGTON	TN		10E	44
SMITH ROBERT LEE	SP4	AR	06 NOV 43	29 JAN 66	WELCH	WV		4E	115
SMITH ROBERT LEE	SSGT	AR	22 AUG 32	25 MAY 68	CHILLICOTHE	OH		67W	6
SMITH ROBERT LEE	LCPL	MC	09 JAN 46	31 MAY 68	MONROE	MI		62W	17
SMITH ROBERT LEE	PFC	MC	28 MAR 46	02 SEP 68	CINCINNATI	OH		45W	28
SMITH ROBERT LEE	PFC	AR	06 OCT 43	30 DEC 69	CHICAGO	IL		15W	111
SMITH ROBERT LEE JR	LCPL	MC	31 JUL 45	04 MAR 66	NEWPORT NEWS	VA		5E	110

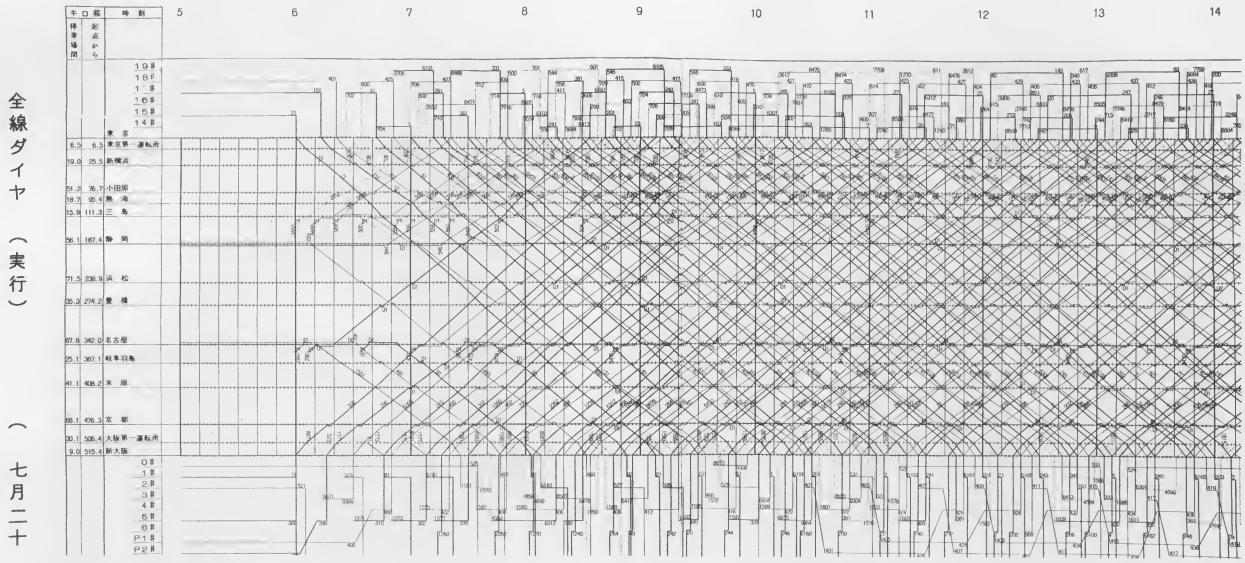
An additional data dimension comes from the ordering of names. The memorial's designer, Maya Ying Lin, proposed that names be listed by death date. Jan C. Scruggs and Joel L. Swerdlow write in their book, *To Heal a Nation:*

"Chronological listing was essential to her design. War veterans would find their story told, and their friends remembered, in the panel that corresponded with their tour of duty in Vietnam. Locating specific names with the aid of a directory would be like finding bodies on a battlefield . . . Some initially disagreed. If 58,000 names were scattered along the wall, anyone looking for a specific name would wander around for hours and then leave in frustration. One solution seemed obvious: list everyone in alphabetical order . . . But when a two-inch-thick Defense Department computer listing of Vietnam casualties was examined, thinking changed. There were over 600 Smiths; 16 people named James Jones had died in Vietnam. Alphabetical listing would make the memorial look like a telephone book engraved in granite, destroying the sense of unique loss that each name carried."

And so the names serve a triple function: to memorialize the particular person who died, to make a mark contributing to the total, and to indicate sequence and approximate date of death. A book listing the names alphabetically serves as a finder, locating the position of each engraved name.

The spirit of the individual created by the wall—of each individual death and of each viewer personally selecting—decisively affects how we see other visitors. The busloads of tourists appear not as crowds but rather as many separate, individual faces, not as interruptions at an architectural presentation but rather as our often emotional coparticipants at the memorial.

PHOTOGRAPH BY LLEWELLYN



This computer-graphical timetable governs Japanese *Shinkansen* or bullet trains. The station stops appear down the side, and time of day is across the top. The diagonal lines show the path of each train in space and time.

GRAPHICAL TIMETABLES ALSO exemplify micro/macro design. Station stops are plotted down the side of the grid. Time of day runs across the top. The diagonal lines show the space-time path of each train. We see the overall structure and pattern of the railroad system, as all the lines aggregate and form patterns.

The computer-graphical timetable shown here governs the Japanese high-speed trains, called *Shinkansen* or bullet trains. The Tokyo control room that guides those trains is filled with graphical timetables, strips of paper 10 feet long, which keep track of hundreds of trains each day—a task that makes clear the enormous advantages of *seeing* information in graphical form rather than merely tabulating, recording, and reproducing data.

Also in the Tokyo control room are many computer terminals reporting the actual arrival and departure times for each train at every station stop, and then comparing those times with the schedule. When I visited the control room, I saw a red dot on the computer screen next to a number and asked what the dot signaled. The Japanese explained that if any train at any station, either in or out of the station, deviated by more than 30 seconds from the planned schedule, then this red indicator would flash on—and there would be trouble.

When I returned to the United States, I inquired about Amtrak's definition of "on time." Amtrak uses a single indicator of on-time arrival—whether the train arrived at the last stop within five minutes of the scheduled time. In fact, sometimes a 30-minute grace period is allowed.

What we have here is an order-of-magnitude difference in error tolerances between the two countries. Such differences have enormous consequences in a world where precision and attention to detail are heavily rewarded. Indeed, much of the Japanese success story can be written simply as *attention to detail*.

The stem-and-leaf displays of statistical analysis also rely on micro/macro design. Each data point simultaneously names its value and fills a space representing one counted unit, like names on the Vietnam Veterans Memorial, with spaces then adding up to form a profile of the overall distribution.

The plot shown here indicates heights of 218 volcanoes; each individual number becomes part of the histogram. In this invention by the great statistician John W. Tukey, micro-data has replaced the information-empty bars of a traditional bar chart.

0 | 9 = 900 feet

Stem-and-leaf displays:
heights of 218 volcanoes, unit 100 feet.

19 | 3 = 19,300 feet

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0| 98766562
1| 97719630
2| 699877665444222110098 50
3| 876655412099551426
4| 999884433319294333611 07
5| 976666665544222100977 31
6| 8986654410777610 65
7| 98855431100652108073
8| 653322122937
9| 377655421000493
10| 0984433165212
11| 4963201631
12| 45421164
13| 47830
14| 00
15| 676
16| 52
17| 92
18| 5
19| 39730
```

In a similar fashion, the Japanese train schedule cleverly positions individual departure times so that they combine to form an overall frequency distribution. Leading hour-digits need not be shown over and over; instead, minutes can be stacked. Revealed is the overall time distribution of 292 daily trains, with peaks during morning and evening rush hours.

時	平日下り																								
5	06	18	31	40	46	58																			
6	04	12	18	21	30	38	41	49	55	59															
7	03	08	14	17	23	26	30	35	38	40	45	47	49	54	56	58									
8	03	06	09	16	20	22	26	30	32	36	40	42	50	52	54										
9	00	02	04	10	12	14	20	22	24	29	31	33	41	43	50	53	57								
10	01	03	07	11	12	17	20	22	26	29	34	37	40	45	49	54	57								
11	00	05	08	12	17	19	25	28	32	37	39	45	48	52	57	59									
12	05	08	12	17	19	25	28	32	37	39	45	48	52	57	59										
13	05	08	12	17	19	25	28	32	37	39	45	48	52	57	59										
14	05	08	12	17	19	25	28	32	37	39	45	48	52	57	59										
15	05	08	12	17	19	25	28	32	37	39	45	48	52	57	59										
16	05	08	09	16	18	21	27	29	32	36	40	42	48	50	52	59									
17	01	04	10	12	14	19	22	24	26	30	32	34	36	40	43	45	47	53	55	57					
18	01	03	05	07	13	15	17	21	23	25	28	33	35	37	41	43	45	48	50	55	57				
19	01	04	06	08	13	15	17	20	23	25	27	32	34	36	40	43	45	47	51	53	55				
20	00	02	04	10	12	14	19	21	23	30	32	34	39	41	46	50	52	58							
21	01	06	09	11	18	21	26	29	31	38	41	46	50	51	58										
22	01	08	11	17	21	29	32	39	44	51	53	59													
23	04	10	14	21	30	36	47	54																	
24	03	15	21	23																					

The shrewd design saves 777 characters, avoiding the typographical extravaganza of the list of departure times, which lacks the intensive annotation of the original and also fails to provide clear testimony about frequency of train service by hour.

5.06	7.17	8.28	9.31	10.40	11.57	13.12	14.28	15.45	18.52	17.53	18.45	19.40	20.39	21.51	23.36
5.18	7.23	8.30	9.33	10.45	11.59	13.17	14.32	15.48	16.59	17.55	18.48	18.43	20.41	21.58	23.47
5.31	7.26	8.32	8.41	10.49	12.05	13.19	14.37	15.52	17.01	17.57	18.53	19.45	20.46	22.01	23.54
5.40	7.30	8.38	9.43	10.54	12.08	13.25	14.39	15.57	17.04	18.01	18.55	19.47	20.50	22.09	24.03
5.46	7.35	8.40	9.50	10.57	12.12	13.28	14.45	15.59	17.10	18.03	18.57	19.51	20.52	22.11	24.15
5.58	7.38	8.42	9.53	11.00	12.17	13.32	14.48	18.05	17.12	18.05	19.01	19.53	20.58	22.17	24.21
6.04	7.40	8.50	9.57	11.05	12.18	13.37	14.52	16.08	17.14	18.07	19.04	19.55	21.01	22.21	24.23
8.12	7.45	8.52	10.01	11.08	12.25	13.39	14.57	18.09	17.19	18.13	19.06	20.00	21.06	22.29	
6.18	7.47	8.54	10.03	11.12	12.28	13.45	14.59	18.16	17.22	18.15	19.08	20.02	21.09	22.32	
6.21	7.49	8.00	10.07	11.17	12.32	13.48	15.05	16.18	17.24	18.17	19.13	20.04	21.11	22.39	
6.30	7.54	9.02	10.11	11.19	12.37	13.52	15.08	16.21	17.26	18.21	19.15	20.10	21.18	22.44	
6.38	7.56	9.04	10.12	11.25	12.39	13.57	15.12	18.27	17.30	18.23	19.17	20.12	21.21	22.51	
6.41	7.58	9.10	10.17	11.28	12.45	13.59	15.17	16.29	17.32	18.25	19.20	20.14	21.26	22.53	
6.48	8.03	9.12	10.20	11.32	12.48	14.05	15.18	16.32	17.34	18.28	18.23	20.18	21.29	22.59	
6.55	8.06	9.14	10.22	11.37	12.52	14.08	15.25	16.38	17.36	18.33	19.25	20.21	21.31	23.04	
6.58	8.09	8.20	10.26	11.39	12.57	14.12	15.28	18.40	17.40	18.35	19.27	20.23	21.38	23.10	
7.03	8.18	9.22	10.29	11.45	12.58	14.17	15.32	16.42	17.43	18.37	19.32	20.30	21.41	23.14	
7.08	8.20	9.24	10.34	11.48	13.05	14.18	15.37	18.48	17.45	18.41	19.34	20.32	21.46	23.21	
7.14	8.22	8.29	10.37	11.52	13.08	14.25	15.39	18.50	17.47	18.43	18.36	20.34	21.50	23.30	

In such micro/macro designs, the same ink serves more than one informational purpose; graphical elements are *multifunctioning*. This idea suggests a particular missed opportunity in the stem-and-leaf timetable—surely the leaves of numbers can grow from both sides of the central stem.

So it is. The detailed timetable shown below records trains in both directions from the station, with platforms 7 and 8 at the left and platforms 5 and 6 at the right. The array sends a few numbers around the bend when times for left-side morning rush hours exceed the format capacity.

Such displays are sometimes called "back-to-back stem-and-leaf plots" in heavy-breathing statistical jargon. Japanese train passengers have managed for decades to use the schedule without knowing the fancy name.

WE THRIVE IN information-rich worlds because of our immense human capacities to select, edit, focus, group, harmonize, condense, reduce, choose, categorize, merge, filter, abstract, skip, scan, idealize, isolate, check out, extrapolate, screen, sort, blend, average, lump, smooth, inspect, approximate, cluster, aggregate, summarize, dip into, flip through, browse, leaf through, search, skim, glean, winnow the wheat from the chaff, and separate the sheep from the goats.

横浜駅発東海道線

時	7・8番(品川・新橋・東京方面)	時	5・6番線(小田原・熱海・静岡方面)
59	09 4 54 25	5	25 47 4 52
56	51 47 38 34 20 09 04	6	14 31 54
52	49 45 42 38 35 31 27 21 16 12 04 00	7	07 16 32 36 41 51
47	43 39 35 31 27 24 20 17 13 10 06 03	8	03 13 25 27 34 41 48 58
52	57 40 36 28 14 05	9	05 12 25 27 35 46 59
58	56 47 37 32 24 19 10 06	10	10 19 25 34 49 55
	56 43 34 30 21 16 08 05	11	04 19 25 29 39 49
	59 41 36 23 09	12	04 19 25 34 49 55
	56 45 35 28 10	13	07 19 34 45 55
	49 36 31 26 09	14	04 19 34 43 50 55
	51 40 31 20 09 04	15	03 19 32 36 49
	56 51 40 32 30 19 05	16	01 23 35 49 59
	56 44 35 33 19 12	17	03 14 17 23 29 34 42 48 55
	56 51 36 25 06	18	01 07 13 20 26 29 36 39 47 57
	59 53 49 41 30 13 06	19	04 12 15 22 24 29 39 49 59
	53 37 24 09	20	09 18 29 39 42 50
	48 34 18 05	21	03 13 24 27 34 45
	43 22 06	22	04 19 34 49
	51 13	23	06 13 18 44 54
	07	0	23

In short, less is a bore. ◩

High-information displays are not only an appropriate and proper match to these human capabilities, but such designs are often optimal. If the visual task is contrast, comparison, and choice—as so often it is—then the more relevant information within eyespan, the better.

Low-density displays, that dreaded posterization of information, spread over pages and pages, or over computer screens scrolling scrolling scrolling, require viewers to rely on visual memory—a weak skill—to make a contrast, a comparison, a choice. Rich micro/macro designs enforce contextual comparisons—exactly what viewers need for reasoning about information.

High-density designs also allow viewers to select, to narrate, to personalize and recast data for their own uses; control of information is given over to viewers rather than to editors and designers.

Low-information, forgetful displays move viewers toward ignorance and passivity, at the same time diminishing the credibility of the information source. Thin data rightly prompts suspicions: What are they leaving out? Is that really everything they know? What are they hiding? What did they shred?

Occasionally a claim is made that empty space is "friendly." What matters, however, is not the amount of empty space but how it's used. Conversely, it's not how much information there is, but rather how effectively it's arranged.

What about confusing clutter and information overload? Doesn't information have to be boiled down and simplified? These questions miss the point. The quantity of detail is an issue entirely apart from the difficulty of reading. *Clutter and confusion are design failures, not information attributes.*

Richard Saul Wurman, the designer, put the matter clearly: "Everyone spoke of an information overload, but what there was in fact was a non-information overload."

The philosophy of micro/macro design has a clear consequence for personal computers: trade nearly anything away (including color) for enhanced display resolution. And the same goes for output devices: invest in the highest affordable resolution. All the history of communication devices is nothing but a progress of methods for enhancing density, richness, complexity, and data dimensionality. Accept no substitutes.

The fundamental reason for displays that portray complexity and intricacy is that the world we seek to understand is complex and intricate. "God is in the details," said the architect Mies van der Rohe, capturing the essential quality of micro/macro designs.

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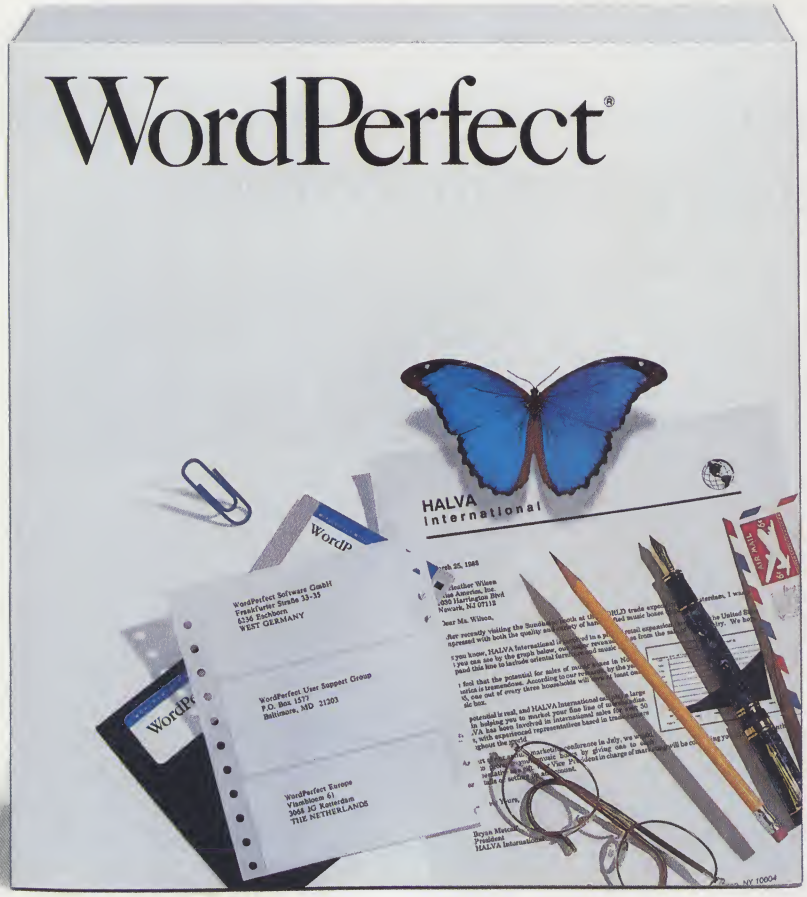

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Akihabara

Down the alleys and through the arcades of Tokyo's inscrutable high-tech bazaar.

By RICHARD A. SPRAGUE

Five-story department stores stand squashed together like packing crates, each bursting with the latest in consumer electronics. State-of-the-art computer equipment, digital audio tape stereo systems, personal air conditioners, color televisions from 3-inch LCD midgets to 30-inch wall-size mammoths. If it's electronic, it's here, in every size, in every color, at every price.

To those whose hearts beat faster at the sight of row upon row of electronics bargains, this is heaven. This is the Akihabara, a Tokyo district four minutes by train from the central city station.

The old Japanese name *Akihabara* means "field of autumn leaves," but you won't find anything dead or dying here. Sirens stand outside almost every shop and lure customers inside by cheerfully spouting technical specs. Young Japanese girls in skimpy uniforms brave the hot summers and snowy winters, hawking everything from Sony 2-inch disk drives to beautiful color LCD displays made by Sharp and Epson.

Boxes of PCs are piled floor to ceiling. Practically all carry the logo of NEC, whose more than 50 percent share of the Japanese market is only now being challenged by

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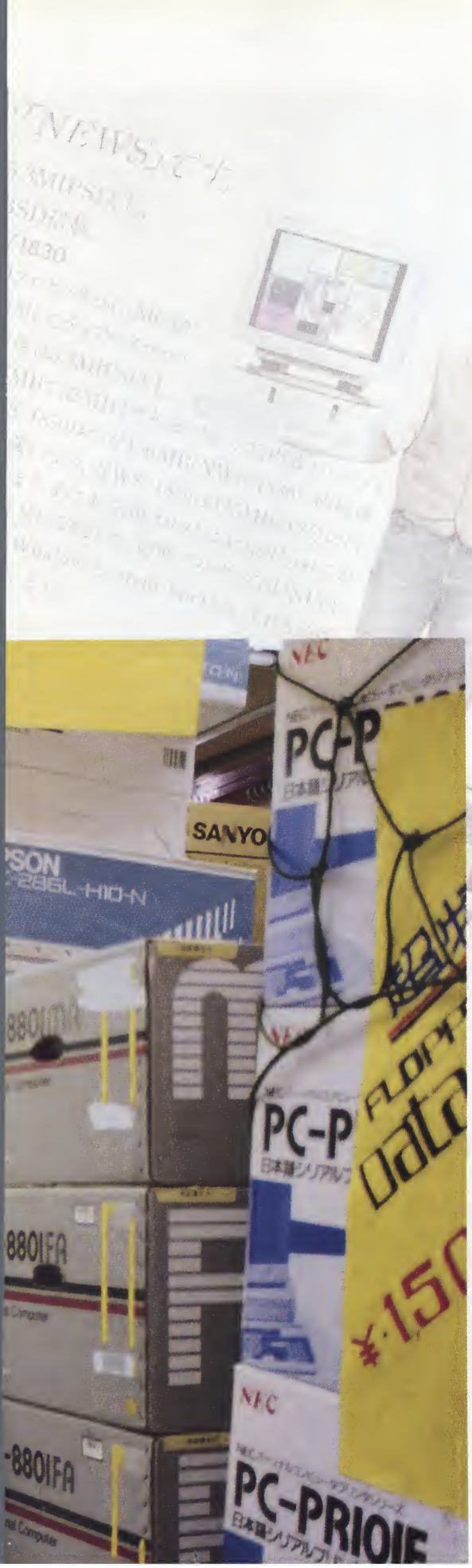
SANYO
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PC-PR10IF
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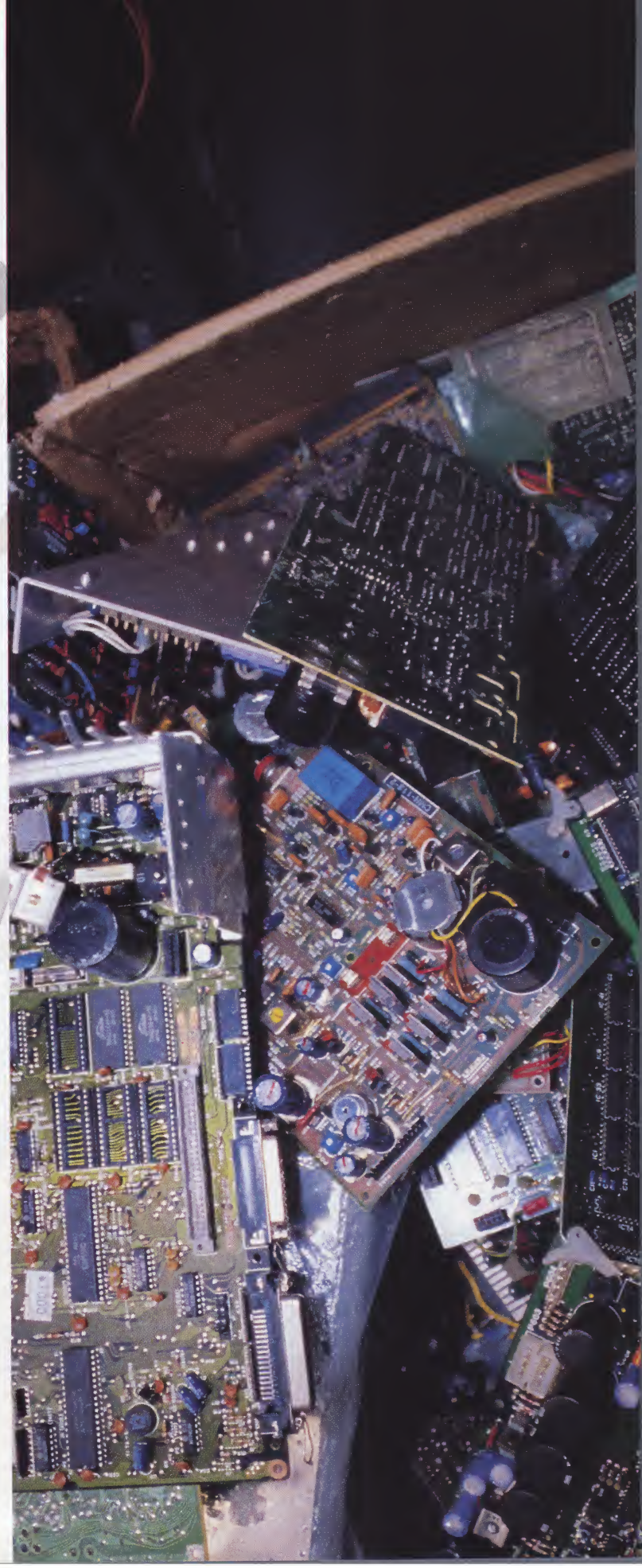

upstart clones from Epson. The typical office PC in Japan uses NEC's cloned, and faster, version of Intel's 8086 microprocessor, runs a Japanese version of MS-DOS, and has 640KB of memory, Microsoft BASIC in ROM, a 640-by-400-pixel color monitor, and 5¼- or 3½-inch disks (your choice, but the one-megabyte size is standard). Prices start at $2,000.

Printers are for sale here, too. The output of the dot matrix machines from Epson and NEC is excellent; 24-pin machines have been common for several years in Japan, and 48-pin printers are just coming to market. But even though most laser printers are made in Japan, their sales lag behind in the Akihabara. Their prices are too steep by the time the manufacturers add the enormous font cartridges necessary to handle the Japanese language.

Vendors in the Akihabara sell more computers than software packages. Lotus 1-2-3, WordStar 2000, SuperCalc, Microsoft Chart, and hundreds of good Japanese packages can be bought there, but American software companies have been slow to modify their products to compete in Japan. One of the reasons is that the local software industry is crippled by pirates.

Souped-up Japanese equivalents of the Z-80s and 6502s that disappeared from the U.S. mainstream about five years ago power the best-selling computers and software. How can this obsolete technology be so

popular in this state-of-the-art paradise? The Japanese use the chips as standalone word processors with built-in printers or in game machines that they can sell cheaply in huge volume.

The Japanese publishing industry produces more new titles each year than U.S. publishers do, and computer books are no exception. Bookstores are everywhere in Tokyo, and, as in America, you

can choose from dozens of machine-specific magazines and thousands of technical books. You can find everything from a manual on how to write your own LISP compiler to a three-volume tome on copy protection.

Nobody said that heaven was cheap. The plunge of the dollar means that American shoppers won't find many bargains in the Akihabara. Most televisions, stereos, and PCs can be bought for less as export models in California or New York.

But for variety, quality, and state of the art, no place on earth can match the Akihabara. ◩

Richard A. Sprague has worked as a software engineer in Tokyo for NEC Aerospace Systems. He currently lives in Palo Alto, California, and consults on issues related to the Japanese PC market.

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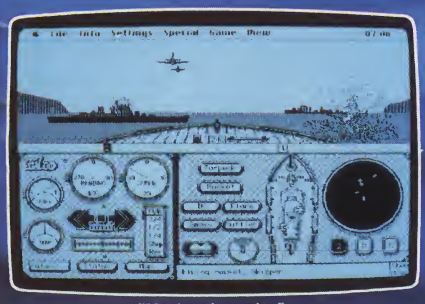

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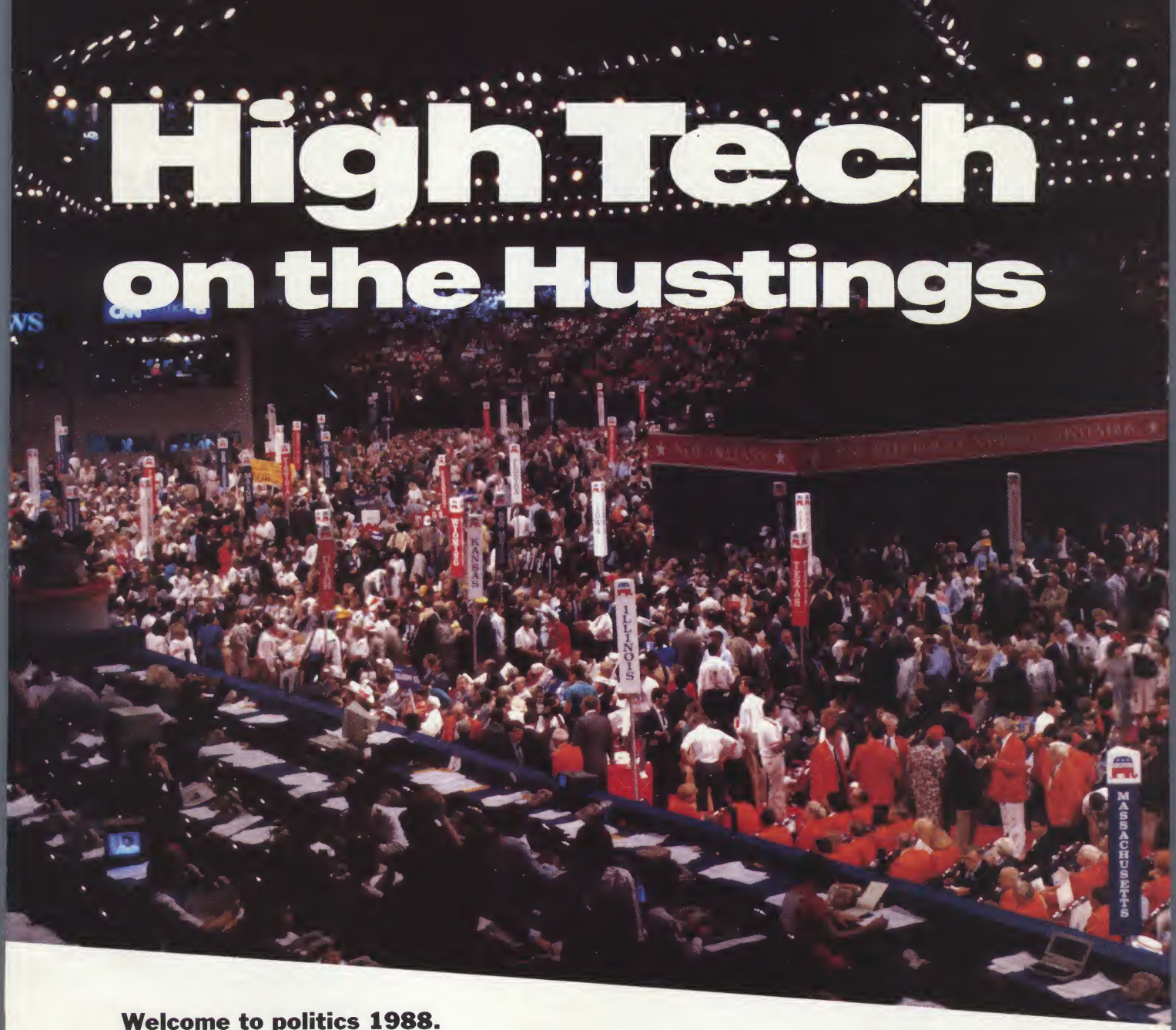


PHOTOGRAPH BY TRIPPETT/SIPA

Welcome to politics 1988. The PC has joined the party.

By EDMUND DAY

When 90 million Americans go to the polls on November 8, they'll be doing a lot more than pulling the lever for the candidates of their choice. Without knowing it, they'll also be voting in the first election in which the outcome was decided, perhaps more than anything else, by computers.

By all accounts, 1988 marks the coming of age for computers in political campaigning, just as 1960 was a watershed year for the impact of television on the elections. This year, computers of all stripes, and PCs in particular, have forever altered the way in which campaigns are waged. In a tight race it may be the candidate with the best computer operation—rather than the one with the most photogenic face or the most moving message—who becomes our next president.

Whether helping to raise funds, target voters, do the grunt work of scheduling, or perform any of dozens of other tasks that are the lifeblood of politics, PCs have been both parties' most tireless and effective workers.

GOP Mainframe Tradition

Republicans may rail against oversized government, but when it comes to computers, they've long believed bigger is better. For several years, the well-heeled GOP has used expensive mainframes to maintain a massive library of demographic data on 70 million voters for tracking national voting trends. The Democrats, on the other hand, have traditionally been less well equipped with hardware.

The Republican National Committee computer center, established in the aftermath of Watergate, paid off with Reagan's successful bids in 1980 and 1984. Republican campaigners fondly recall 1984, when the Reagan campaign turned out multimillion-copy mailings and performed sophisticated demographic analyses to determine campaign strategy, while hardware-poor Walter Mondale had to borrow time on union-owned computers to prepare the financial statements required by the Federal Election Commission (FEC).

George Bush hopes to maintain his party's computerized edge. During the 1988 effort, his organization has used the party's two mainframes to store and retrieve information on Michael Dukakis and the Democrats, in essence creating a computerized database of Dukakis's record and statements. Staffers are also using the mainframes in their efforts to raise funds and target voters.

The abilities of personal computers have not gone unnoticed by the GOP. A Compaq 386 aided the Bush campaign's delegate-counting operation, using a customized FoxBase Plus database program to compile information on every Republican delegate, right down to birthdays and anniversaries. The campaign even sends out greeting cards to mark these occasions.

In addition, the Republicans experimented with buying and distributing computer hardware to congressional and senatorial campaigns throughout the country. But Tom Brown, computer services manager for the National Republican Congressional Committee, says that "the process of allocating and keeping track of the equipment was too time consuming and expensive."

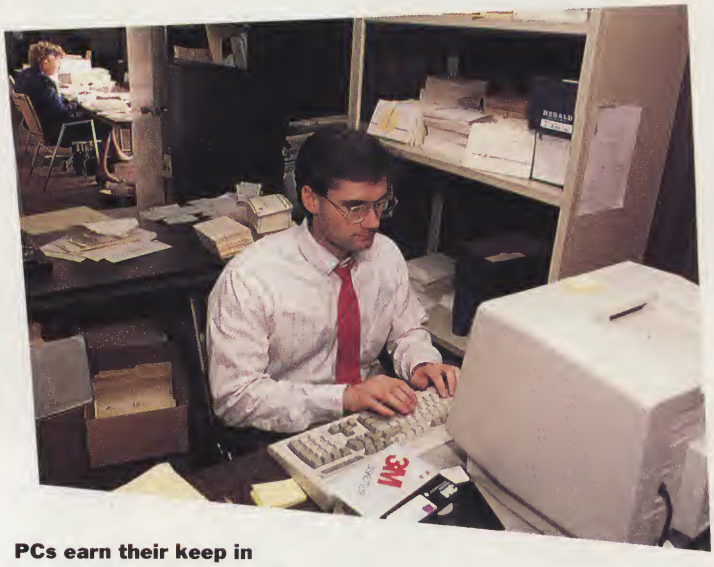
Brown and his staff now act as computer consultants to various Republican campaigns. Bolstering their work is The Republican Information Network, a service that helps campaigners find strategic information that can make a difference in their contests.

Democratic Connections

While Republicans primarily rely on mainframes and minicomputers, Democrats have focused on minicomputers and networked PCs. Democrats such as Representative Bob Carr of Michigan stress that theirs is a cost-conscious approach, in contrast with the Grand Old Party's high-cost methods.

As Carr told *The Boston Globe,* "The Republicans became involved with computers in the 1970s, when computing meant mainframes. The Democrats waited until the cost came down and networked microcomputers were the cost-effective means of office automation."

Bill Combs, executive director of Democrats 2000, an independent organization of progressive Democrats, points out that "the Republicans jumped way ahead in some areas during the '60s and '70s." The GOP was particularly successful in using mainframes for direct-mail fundraising and in voter trend analysis. But now, Combs says, "there's not much technology difference in the sophistication of the two parties."



PCs earn their keep in gritty back-room settings.

PHOTOGRAPH BY TRIPPETT/SIPA

California Democratic representative Tony Coelho is widely credited as being one of the people responsible for computerizing the Democrats. As head of the Democratic Congressional Campaign Committee (before becoming party whip), Coelho brought in the people who built his party's IBM PC network.

One of those people was Combs. "We chose microcomputers for a variety of reasons," says Combs. "Number one, they're affordable across the spectrum of the party. So in early 1985 we decided to network PCs. The network we built has now expanded to more than 200 PCs at headquarters, working off Sun 3/280 workstations."

Individual PCs are also a strong presence at Dukakis headquarters, which is housed in an unpretentious office building in South Boston. In addition to Digital minicomputers, a visitor will see nearly every available brand of PC in the Dukakis office. Early on,

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Edmund Day, a writer based in New York, is author of The New Immigrants.

when the budget was tight, Dukakis fundraisers encouraged contributors to donate whatever PCs they had on hand to the campaign.

Pamela Lowry, director of computer operations for Dukakis, says that the Digital equipment handles all the fundraising, the FEC reporting, and the campaign's budget and accounting system. PCs do everything else, mostly with word processing software.

The Personal Question

No one disputes that computers help campaigns run more efficiently. Some people fear, however, that they make political campaigning too impersonal.

This issue came up during the Michigan primary, when Democratic candidate Richard Gephardt used a computer to telephone voters throughout the state with a tape-recorded campaign message. Gephardt's use of a tactic borrowed from the telemarketing industry met with mixed reactions.

Despite worries about impersonal practices, some analysts believe that computers can enhance the personal touch in politics. Andy Luther of Campaign Software, a software developer that writes applications for the Republicans, admits that "computers can't walk the streets and hand out literature, give a firm handshake, or kiss babies." But he adds that they can automate many campaign tasks, freeing up workers and candidates to focus on individual voters.

Combs thinks it can be difficult to get personal about information if you're dealing with a huge national database. When PCs are used on the local level, however, things change.

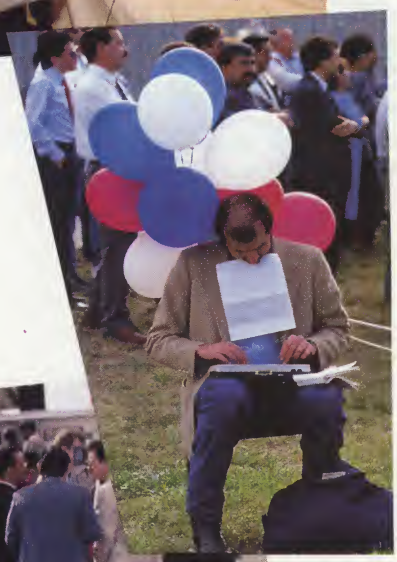
"Where a few years ago I heard, 'No, computers are too impersonal, and you've got to campaign personally, face to face, one on one,' from a lot of politicians—the same reaction I had to the tape-recorded phone call—now we understand that the computer can make campaigning much more personal, by getting away from the huge mainframes in D.C. with millions of names and addresses on them, and getting the technology down to the people who can use it locally in a personal way," Combs says.

Online databases have also opened up the political process. At the Democratic convention, a Dialcom database offered subscribers online information both from the convention's own bulletin board, which posted schedules and other convention details, and via the Presidential Campaign Hotline, an online service that offers daily news and commentary on political events. Among the details available through Dialcom were complete texts of speeches in advance; journalists agreed to hold off reporting on them until they were delivered by the politicians.

Indeed, before Jesse Jackson gave his long-awaited speech at the convention, many people—including members of the Republican National Committee, the White House, and even the staff of the Japanese Embassy—already knew what he was going to say.

Dialcom's Pat Emerson says the way the Democratic National Convention used computers to communicate with delegates and the press was "a major step forward in the availability of information." With computers, she says, the convention "opened up what is quite often a fairly controlled and limited process to a lot more people. And that kind of information access, the ability to know what's happening without being there physically, is a major and truly innovative change in the way information is used and perceived in the political arena."

Thomas Hofeller, computer services director of the Republican National Committee, believes the use of PCs "offers us a way to *(continued on page 134)*



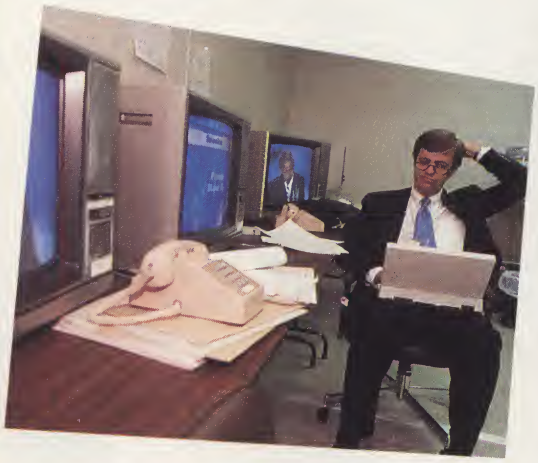
Politics has been transformed by laptop computers, which are now as commonplace on the hustings as mud-slinging and blue-sky promises.

PHOTOGRAPHS BY KENNETH JARECKE

News from the Campaign Trail

By BRIT HUME

The chartered light plane bucked and dipped in a fierce headwind as it pushed north toward Chicago. The heater didn't work and the four-seat passenger compartment was frigid. My hands were freezing, but I had to write because it was too late in the day to wait. My portable computer was open in my lap; I kept having to turn it or adjust my body to get good light on the screen. The typo count was high but manageable.



The author, caught in a rare moment of puzzlement.

We had dropped off the Jesse Jackson campaign in southern Illinois that March afternoon because "World News Tonight" wanted a report on Jackson, who looked as if he might win the Illinois primary. Our destination was Chicago, to use an ABC News bureau with videotape editing facilities and the equipment to feed a report by satellite to New York.

But it was late when we left, and that headwind would make it 45 minutes later than usual by the time we reached Chicago. That would be around 5:30 p.m. in the East, only an hour before airtime. Fortunately, we would land at Meigs Field, which is downtown, but we would still have only about 45 minutes to record my script, screen and edit the tape, and add a stand-up close, which I would have to do while the rest of the piece was being put together. My producer, Marianne Keeley, had her computer open as well, and she was entering, from an audiocassette, the exact text and length of what Jackson had said that day. That would save time later. Still, we both knew this would be terribly close.

On a normal day, a correspondent and field producer have at least a couple of hours to look at videotape, draft a script, and discuss it with the "World News Tonight" producers in New York. Then the correspondent records the script, and the tape is edited together with the pictures and a stand-up close to form the 1½-to-2-minute report that finally appears on the air. But in covering a presidential candidate, there are few normal days, and this one was worse than most.

By the time I walked in the door of the bureau, I had the script written. I hooked my computer up to a phone jack, called the ABC mainframe, and uploaded the script. Then I called New York and told them it was there. From a mainframe terminal I printed out three copies, one for me, one for Marianne, and one for the videotape editor. Script approval was delayed by an argument with the producers in New York over whether it was appropriate for me to say Jackson had gotten, at a tumultuous high school appearance that day, "the kind of reception usually reserved for Michael Jackson." I had taken the liberty of recording the script before it was approved. Fortunately, I won the argument, which meant the voice track did not have to be redone. The piece was no prizewinner, but it made the first broadcast of "World News Tonight" at 6:30, which is about all we could have hoped for that day. Without those portable computers, we probably wouldn't have made it.

Smaller Is Better

In fact, if we had been using any other computer, we might not have been able to work in the turbulence of the airplane that day. We each have a Tandy 200, which, although the model has been discontinued, is the computer of choice for traveling political journalists. Innumerable DOS portables are available now, many with features any journalist would love to have: hard disks, high-resolution screens, and the ability to run the top word processing and communications software. But in the press section of a campaign plane, you rarely see a DOS laptop. The main reason is size. When you travel on a political campaign, you're in a constant struggle against weight: your own, your dirty laundry's, and that of the shoulder bag that every traveling correspondent both requires and despises.

On a campaign, you eat whenever you can because you never know when you'll be able to eat again. You rarely get a chance to exercise, and you sometimes go weeks without staying anywhere long enough to get your laundry done. And every day is a succession of plane trips, bus rides, and treks in and out of events. You leave your luggage with the campaign in the morning and don't see it again until you finally get to your hotel at night. So if there's anything you may need during the day, you have to carry it in your shoulder bag. That means your computer, extra batteries, usually a small tape recorder, cables, acoustic cups or a "blackjack" for hard-wired telephones, and any essential documentation or research.

For a TV journalist, it also means a stopwatch and the necessary earpiece and wires in case you unex-

PHOTOGRAPH BY ROBERT MAASS

pectedly have to broadcast live. It also means some makeup and hairspray. Even the best-looking correspondents need makeup after a few weeks on a campaign, and carrying hairspray is the only defense against a sudden gale just when you're shooting a standup. In all, that's about 5 pounds of stuff, not counting the computer, or a printer, which I refuse to carry.

The lightest of the DOS laptops is the Toshiba 1000. At 6.4 pounds, it may be a marvel of miniaturization, but its keyboard is cramped, and the machine is 2 pounds heavier than the Tandy 200, and heavier still than the smaller Tandy 100 (another discontinued model) and 102. When you carry something around all day every day, those 2 or 3 pounds make a big difference.

Journalists prefer the Tandy 200 because its 16-line, 40-column screen is twice the size of the display of the lighter 100 and 102. It also has a slightly larger keyboard with a full-size cluster of cursor keys instead of the narrow, four-in-a-row layout, which is one of the worst features of the 100/102. The 200 also supports up to three RAM banks of 24KB apiece. RAM overhead for the 200's ROM-based software takes about 5KB in each bank. The built-in software includes a BASIC interpreter, a simple word processor, and a communications package that is designed for the computer's built-in 300-bit-per-second modem but will drive external modems from terminal mode.

The 200 is a bare-bones system, but it's remarkable how capable a Tandy machine can be with a little enhancement. For example, I have Traveling Software's Ultimate ROM II, a tiny snap-in chip that contains a database and an outliner and adds several word processing features, including overstrike mode, full search-and-replace, and a word counter. It also has a powerful menu-driven print formatter that has saved me several times when my practice of not carrying a printer could have been a major problem.

On the Jesse Jackson press bus, Tandys outnumber DOS machines.

PHOTOGRAPH BY KENNETH JARECKE

Ironically, print journalists don't need printers; they just need to be able to send their stories electronically. But a broadcaster needs hard copy to read while recording and for the producer and editor to have before them. I have a Diconix 150, which is remarkably compact but still too heavy for me. Its nickel cadmium batteries add more weight and the hassle of having to recharge them. The heavy, bulky AC adapter is no solution, either. I don't carry AC adapters and bring just one extra set of double-A batteries.

Sometimes a producer will carry a printer, but if not, I gamble that wherever I go, someone will have a PC with a printer I can use. Tandy computers don't send a line feed with each carriage return, which means that my Tandy hooked up to an IBM system's printer will print a file all on one line. To get around that, I use Ultimate ROM's print formatter, which lets me send a carriage return. This way, I don't have to grope for dip switches in unfamiliar printers. People have been nice, if a little nervous, about letting me disconnect their printers, connect my Tandy, run off a few copies, and then put things back the way they were. I have printed files in the data processing department of *The Atlanta Constitution,* in the front office at several ABC affiliate stations, and at a military base in Indiana.

I also use a handy communications utility called X-Tel from Sigea Systems of Weston, Massachusetts, which gives me access to the word processor while I'm still online. It's a great help when I'm sending a script a little at a time. I can send, write some more, then send again without having to redial and log on. It also helps when I am using the ABC mainframe to check the newswires while I'm writing. The one bit of extra weight I do allow is a pocket-size 1,200-bps modem from Touchbase Systems.

You might think I've packed as much computing power into as few pounds as possible, but as I was writing this, I was contemplating changing to a Tandy 102. It has only one bank of memory, 32KB maximum, but I can store files in the ABC mainframe if necessary. There is even more software for it than for the 200, including an astonishing macro program called Supera from Ultrasoft Innovations of Champlain, New York. It is as powerful as SuperKey but uses less than 5KB. There's also Ultrascreen, from the same firm, to convert the 102's 8-by-40 screen to 10 by 60. That means 600 characters onscreen at a time, only 40 fewer than the 200. Best of all, the 102 weighs only 3 pounds. Think of that. ◪

Brit Hume, national correspondent for ABC News, covered the Jackson and Bush campaigns this year.

High tech meets hijinks at the Democratic National Convention.

PHOTOGRAPH BY GAD SHUSTER

put the data in the hands of the legislative and local campaigners, so that they can use the power of micros to do the things they could not afford to do through the big vendors." When small computers link up more efficiently with larger ones, he says, "that's going to make this process really open up."

Getting Organized

Organization is key to running a successful campaign, and it's one of the most valued strengths of computers. For example, converting Michael Dukakis from his old campaign management techniques to the new, computerized methods grew from an initially low-tech fundraising effort Pamela Lowry undertook on his behalf.

Lowry recalls that when she signed on with Dukakis, she asked to see the contributor lists. "I was pointed to these different boxes that were as yet unpacked," she says. "In those boxes were shoe boxes full of 3-by-5 cards from the 1974 campaign and shoe boxes full of 4-by-6 cards from the 1978 campaign, which Michael had lost. The cards had never been cross-matched. There were also file folders full of lists, supposedly of campaign workers, filed by town, but there was no relationship between the various files. The lists went on and on, and everything was filed in a different way."

Lowry's first step was to organize the file cards in a color-coded, cross-referenced fashion. "I made the most beautiful file-card system in the world," she says, "and then convinced Michael that we should go to computers."

A Hybrid Beast

Lowry and others have found that crossbreeding politics and computers creates a new creature with the potential to alter radically the way we go about choosing our elected officials—from town councilman to president of the United States. That beast, however, can be difficult to control.

"There are certainly some wonderful things out there," says Lowry, "but a lot of them are frills and bells and whistles"—in other words, the systems are neither cost- nor time-effective in the unpaid-volunteer, labor-intensive environment of political campaigning.

"There are lots of products, but little information to evaluate them with—which campaigns have used them and how, and with what results," says Tom Brown of the National Republican Congressional Committee. "We don't as yet know if the products available are meeting the political campaigns' demands, whether they've caught up with our expectations."

Lowry speaks of the "Whoops—reality!" factor. "In some ways," she says, "a campaign is probably not the best place to look for super state-of-the-art maximum utilization of wonderful, exciting new computers." It's a crisis environment with a tremendous turnover. "Anybody who's been here for a month and really knows the way around probably has to be shipped out to North Dakota to run that office," she says. There's little point in getting overly sophisticated tools because people don't have the time to learn how to use them.

Far from being a cure-all, computer technology works more like an amplifier, maintains Thomas Hofeller. "In a poorly managed organization, computers will create a bigger mess," he says. "In a well-managed campaign, they will make it run better. They're not magic—they require hard work and good management."

Getting the Work Done

The main use for campaign software is fundraising. But campaigns need more than just money, so computers also help with get-out-the-vote mailings, delegate counts and communications, media buying, news releases and press relations, scheduling, financial reporting and cost control, voter trend tracking, online research, and speech writing.

Computerized fundraising lets campaigners reach more people more often, and with a more personalized appeal. Replacing the old hand-updated file cards, computers make it easier to maintain huge lists

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of voters and sort them by sex, race, income, education, and other criteria, and to update those lists more frequently and quickly.

Lowry credits the ability of computers to do what politicians have always done—but more quickly and efficiently—for the highly successful launch of the Dukakis presidential campaign in three traditional areas: fundraising, financial reporting, and campaign organization.

"Thanks to the computer," Lowry says, "the staff was able to go back to early supporters and do a mailing to those nearly 80,000 households within a matter of days." When the money started to come in, she says, "We were able, thanks to our software, to just throw a switch and go from gubernatorial reporting to FEC reporting—a totally different set of rules—so that we could actually process the money, get it into the bank, and have the financial resources to move forward."

The Dukakis database of supporters also included many people who had moved away from Massachusetts but who still receive Christmas cards and newsletters from the organization; these people became the core of many Dukakis presidential campaign committees in other states and turned out to meet him at airports. "This kind of organization," Lowry says, "largely enabled a relatively unknown candidate, the dark horse, to create a creditable national campaign so quickly."

Scheduling is another area Lowry believes has improved as a result of computer experience gained during the primaries. "Let's say that one of the Dukakis daughters was suddenly going to go on this plane," she says. "You would need to worry about who was picking her up at the airport. What time was the flight leaving? Was she expected to be interviewed by the press at any point at the airport or on the plane? Who's in charge in case there's a problem? Do we need a fax machine on the plane? And so on and so forth."

During the primaries, all that information was tracked in a word processing program that was not particularly appropriate for handling such complex scheduling tasks. Now the campaign uses customized software better suited to the chore. Today, says Lowry, a staff member can "go to a single screen and plug in the new event, showing what changes have occurred. We just type all of that information into little selective boxes on one screen, and then the computer puts it in all the right places, rather than a human being having to do it."

Although similar examples of computer automation are common in business, they're new to political campaigns. The new tools are helping staffers handle

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the tremendous number of seemingly trivial details that can weigh down a campaign.

Political Twist

The computer capabilities campaign managers need are similar to those required by any cost-conscious business, but with a twist: Not only are most of the people working on the campaign more politically than technologically experienced, but many are volunteers. This means that software must be easy to use and flexible. It must let fewer people do more, and do it more quickly.

Peter Appel, deputy director of computer operations for the Dukakis campaign, predicts that highly sophisticated, easier-to-use technology will make a significant contribution to political campaigns because so many of the staff are volunteers with little computer experience.

In addition to ease of use, political campaigns need solid vendor support. Help that's available around the clock is vital when you're working day and night to put your candidate over the top. Campaigners stress the need for the commitment—as well as the home phone numbers—of software and hardware specialists.

Another major concern is cost. A $2,000 software package may be a good investment for a senatorial contestant or an incumbent in the House, but the same expense may be way out of line in a smaller congressional campaign, notes Tom Brown.

As campaigns spend more on computer operations, they continue to reap dramatic returns on their investments. Richard Viguerie, a direct-mail specialist for the Republicans, observed in a *New York Times* article that fewer than 50,000 people contributed to Nixon and Kennedy combined in 1960. This year, about 2 million contributors have answered the fund-raiser's call.

Coming of Age

For all these reasons, politics may never be the same again. Mainframes and minis opened the way and helped campaigners cut their baby teeth on huge databases of voter demographics and up-to-the-minute mailing lists. Later on, it was love at first sight between PCs and savvy campaign staffs looking for an edge in glamorous but untested software—with most politicians playing the role of the frowning parents wanting their children to be a little more cautious.

Now, with a few campaign experiences enlivening their diaries, all concerned are searching for a more mature, if less romantic, relationship between politics and computers—based on hard work and mutual respect. ◪

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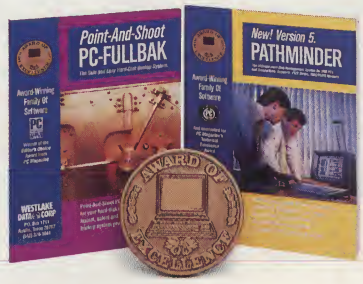

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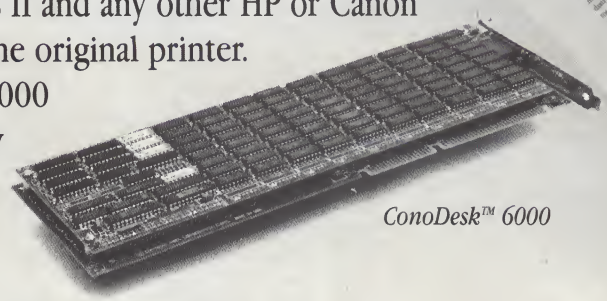

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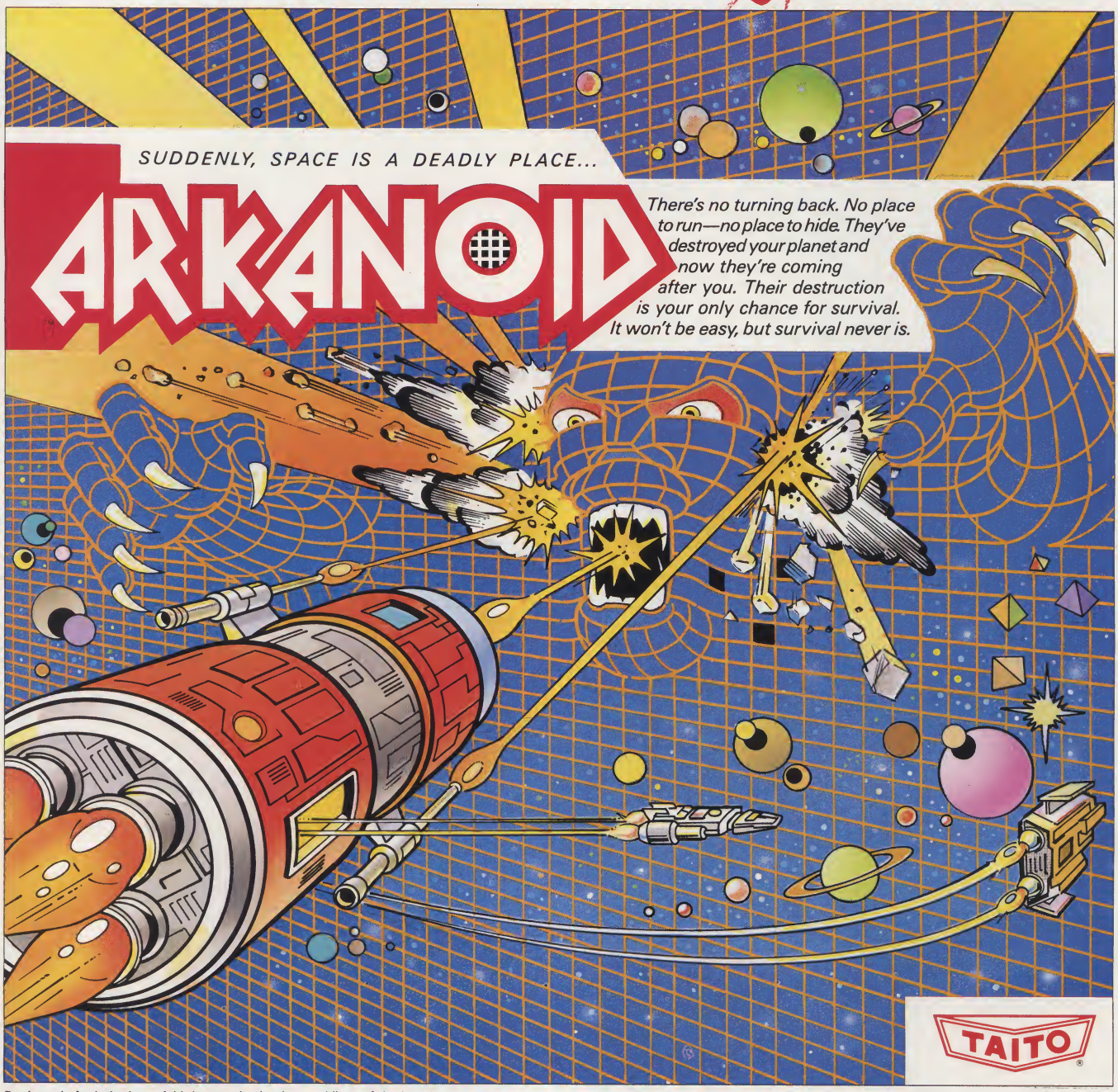

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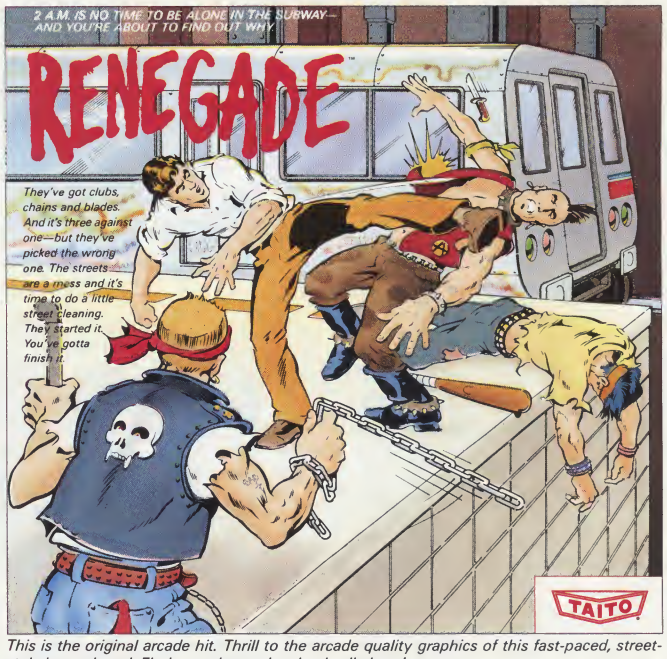

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Twelve Commandments for PC Accounting

Shalt thou keep thy books on a PC? The temptations are legion, but don't be led astray.

By JIM SEYMOUR

Computerizing a small business's accounting functions sounds like a great idea. "Putting the books on the PC" can mean more accurate records, finer financial control, better management information, and an end to much of the terrible drudgery of bookkeeping systems maintained by hand on ledger cards or in "one-write" pegboard accounting systems. Also, the tidy, timely printouts of invoices, checks, W-2s, profit/loss and income statements, and other reports that you'll get from a good PC accounting package will make your customers, employees, suppliers, and bankers, as well as you and the other owners of your business, a lot happier.

Unfortunately, far too many small businesses jump into computerized accounting with too little planning, too few specific goals, and too large dreams. Matching the nature and size of the system you buy and install to the nature and size of your business is an obvious step. What's not so obvious is the need to plan the conversion process in a way that makes sure you put only correct, up-to-date information in the new system, and that maintains the older manual system for some time as a backup.

The need for good backup and security provisions for your electronic accounting records also may not be so obvious—until the day when you lose some of those records because of a hard disk failure or an electronic glitch.

And unless you've been down the path of computerizing a small business before, it will be far from obvious that you should plan to cross-train several people in your office to work with the system, so that

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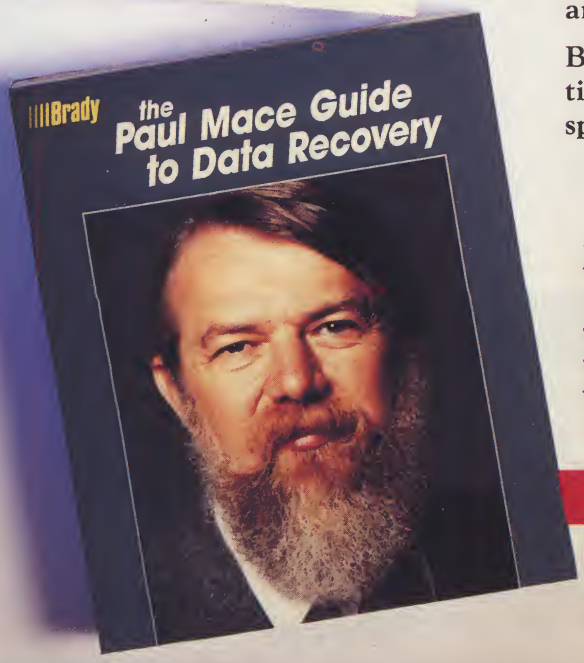
RED



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illnesses, vacations, abrupt departures of key employees, and even firings don't leave you wondering who owes you money this month.

From the perspective of someone who has been down that path dozens of times with small businesses and has helped hundreds of accounting firms set up conversion procedures for their "write-up" clients who want to move into PC bookkeeping, here are 12 rules to keep you out of trouble. Perhaps they aren't quite so absolute as the term "The Twelve Commandments" suggests, but if you're going to break or ignore them, you should at least know *why* you're leaving this tried-and-true path.

I

Don't automate a very small business's accounting at all—especially the payroll. For a truly small business—with, say, two or three employees and gross annual revenues under $250,000 or so—computerizing the books will never pay off. As much of a nuisance as a small payroll can be, maintaining a two- or three-person payroll on a PC can be an even bigger headache. You'll be installing annual updates in the software to accommodate changes in tax laws; you'll waste time threading payroll checks into your printer for just a few checks every month; and you'll soon begin to suspect the whole thing was simpler when you did it by hand.

The dirty little secret: it was.

If you want to get rid of the payroll blues, consider using your accountant's write-up services for this one function—or better still, use one of the third-party service bureaus that perform all payroll-related services, including delivering ready-to-sign checks to your office, for a small fee.

Heresy? Sure. But you wanted a *business* solution, not a computer solution . . . didn't you?

Jim Seymour is editor-in-chief of PC/Computing.

II

Consider using a nonautomated, spreadsheet-based bookkeeping system. Today's best accounting packages are marvels. They can turn out beautiful reports for your banker and tax accountant, nifty aged-receivables reports to help you run your business better, and even graphs and charts showing actual-versus-budgeted.

But all that savvy and fancy output comes at a high cost: the initial investment in time to install and learn the system, and the huge continuing investment to input data and request those reports. A PC-based bookkeeping system that hasn't been updated with the latest figures from your business is worse than useless—it's downright dangerous, because it's too easy to believe those charts and graphs, even when their conclusions are way out of date.

Often, a set of simple spreadsheet programs can maintain records adequate for your business, without the cost or frustration of installing a "real" computer-based bookkeeping system. One spreadsheet might track expenses, another income, and a third depreciable assets such as automobiles and office equipment.

These spreadsheets won't give you fancy output, such as a tidy, up-to-the-minute income statement, ready to hand to the bank officer who's considering your loan application. But they'll give you enough detail to construct that income statement yourself in just a few minutes.

If the idea of a simple, spreadsheet-based bookkeeping system appeals to you, but you want more detail and automation than three or four unlinked worksheets can offer, consider one of the popular Lotus 1-2-3–based add-ons, such as Ready-to-Run Accounting. These programs look and work a little more like a traditional PC accounting package, but they use underlying Lotus worksheets for data entry and data storage.

III

You don't have to computerize everything, only what's most important to your business. Some small businesses computerize their books in a manner reminiscent of the Big Bang theory of creation: everything happens at once, in a cataclysmic burst of light and energy. Those small businesses are good bets for long-term unhappiness with their systems.

Businesses vary phenomenally in their reporting requirements. Maybe what you really need is control over your accounts receivable, because you suspect too many customers are stringing you out too long, paying 30, 60, even 90 days late. Or maybe all you

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need is a job-costing module, to make bidding on complicated projects easier.

Just because the accounting system you're considering has 15 modules doesn't mean you have a 15-module business. Buy and use only what you really need, lest your accounting system become a burden to maintain and you wake up one morning feeling as if you're working for the system, instead of the other way around.

IV

Start with the general ledger, then add accounts receivable (maybe), then accounts payable (possibly) . . . then stop and use the system for six months or more before automating anything else. The general ledger (GL) lies at the heart of any proper double-entry bookkeeping system. For many small businesses, putting the GL on the PC is automation enough.

If you want to go further, the next logical step usually is moving your accounts receivable (AR) onto the computer. Because customers' prompt payment of their bills—and your up-to-the-minute knowledge of who is and isn't paying promptly—are critical to the health of your business, the ability to get aged AR reports is one of the greatest benefits of a computer-based bookkeeping system.

It's hard to devise a rule of thumb for the minimum monthly number of AR entries that justifies computerizing your books. If you have very few but very large monthly billings, a PC-based system can still be a bargain. But if you're sending out 100 or more invoices or 25 or more statements a month, regardless of the amounts, then your business is a good bet for PC-level computerization.

Putting accounts payable (AP) on the computer is the next step for the small business. Once you have a reasonable feeling for how much you're billing, how fast you're collecting, and who pays on time and who doesn't, you can start looking to the power of the PC to control your expenditures.

Generally, you should be writing at least 50 AP checks a month to justify putting AP on the computer; the benefits of computerizing rise very rapidly as the number of monthly payments increases past that point.

In fact, there is a good case to be made for moving all three of these functions onto the computer over the first few weeks or months of your computerization effort. The AR and AP modules feed data to the GL, so you'll have real synergy working for you if you let the computer handle all that posting and balancing.

You should be writing at least 50 checks a month to justify putting accounts payable on the computer; the benefits of computerizing rise rapidly as the number of payments increases past that point.

But then take a breather. No matter what anyone tells you, you *don't* need to move on to putting payroll, inventory, job costing, and who knows what else on the computer. You may want to put them all on eventually, but certainly not at the beginning.

Waiting six months or so after you've moved GL/AR/AP to the computer makes sense. It gives you time to evaluate the system (what if you've bought the wrong accounting software?) and to make sure that people in your office understand it, your accountant likes it, and you think the whole effort is worth the substantial capital and labor costs.

V

Choose your startup date with care, allowing plenty of extra time for your staff to set up the new system. One of the unexpected burdens of moving from manual to computerized bookkeeping is the need to have a firm grip on the

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exact state of your financial affairs on that legendary "date certain" when you make the changeover.

You'll need to know the precise balance in every bank account, the current status of every open account receivable (probably including the amount, serial number, and original issue date of every outstanding invoice, and the amounts and dates of statements sent on those accounts), the status of the depreciation records for every depreciable asset, and many more amounts, correct to the penny, as of the cutover date.

Allow plenty of time to get that data together, and plenty more time to input it into your new system. Remember that the employees learning your system will for the first few weeks be working below normal speed as they march up the surprisingly steep learning curve of even the easiest PC bookkeeping systems. Expect a sag in their productivity during the conversion period.

VI

Run your old (manual) system in tandem with the new system for at least 90 days. This is so basic that it almost goes without mentioning, but far too many small businesses never hear this piece of advice, or they hear but ignore it. Trust me: you'll sleep better knowing that even if this scary new computer system goes bump in the night and loses every bit of data you've put into it, your business will still be safe and sound, thanks to that familiar old ledger book in the safe.

Of course, it costs money—probably more than

you'd think—to maintain and balance two separate sets of books. But it's money well spent.

VII

Keep supporting paperwork for two years (or more, per your accountant). Just because you have an electronic record of a transaction on your computer, don't expect that to satisfy the IRS officers—or your state's sales-tax officials, or your county's tax collector, or any of the other authorities who have the right to prowl through your business life—when they audit your books. They'll want to see original receipts and other supporting paper records. It's just too easy to fake it with computer-based records, and too many people know how.

The exact period for which you'll need to retain records varies from jurisdiction to jurisdiction, and also with the type of record. Two years is generally safe, but for some IRS purposes you'll want to keep records stretching back five years or more. Your accountant or tax lawyer is the best source of advice here: ask for that advice and follow it.

VIII

Make sure three or more people in the office know how to use the system . . . including you. Again, this is obvious advice, but it's often ignored or simply overlooked in the rush to computerize the books. If only one person in the office really understands your accounting software, you're at the mercy of that person's health, wealth, and whimsy. If he gets sick, or wins the lottery and goes to Cap d'Antibes, or just decides to play little games with you, you could be in serious trouble.

The only way to avoid that kind of dependency is to make sure that you have cross-skill training in your office, so that at least three people know how to handle every aspect of the accounting system. In truly small businesses, the boss should be one of those three people.

IX

Involve your accountant before you begin planning, let alone buy, a PC accounting system. Your CPA is truly your best friend when it comes to choosing and installing a computerized bookkeeping system. One expensive fact of life is that you're going to pay for your accountant's training in what's good and bad about your accounting

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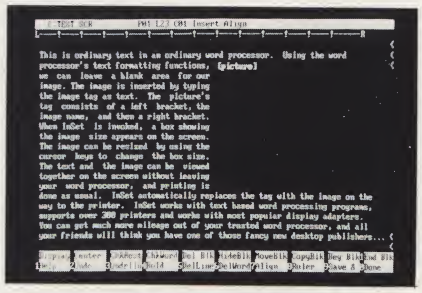

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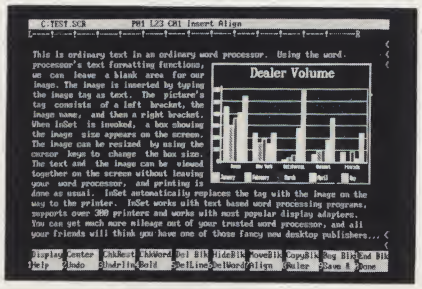

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setup. You can either take his advice about which system to buy—advice almost always based on happy and unhappy experiences with various PC accounting software packages used by other clients—or you can pay him $100 or more an hour to learn the system you picked and then tell you everything that's wrong with it.

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CPAs familiar with PC accounting systems can recommend audit-trail procedures, help write (and sometimes just format) custom reports that you, your accountant, or your banker may need, and draw up your chart of accounts. On every score, your accountant needs to be happy with your choice: why not make him a partner in the buying decision?

X

Don't even think about PC accounting without a hard disk. Keeping your books on floppies is a short route to insanity, not to mention bankruptcy court.

Accounting software packages are notoriously hungry for disk storage space. Accommodate their demands, save time in daily operation, and gain the relative security of fixed data-storage media by setting up your system on a machine with a large, fast hard disk. Don't even consider a disk smaller than 20MB; 40MB and larger is even better.

XI

Establish good backup procedures—weekly, daily, maybe even twice daily—using a grandfather/father/son rotation for existing backups. Let's face it: Hard disks fail. Power lines go down. People kick computer power cords out of wall sockets. And bad guys steal computers from your office at night.

Why be a victim? By establishing good backup procedures, you make it relatively simple to return to the last set of accounting records and update them, so that if you lose hard disk data you can get back in business in a matter of minutes or hours, not weeks or months.

How often should you back up your PC's hard disk? It depends on how much data you're entering—or, put another way, how much data you're willing to lose. If you enter accounting data only once a day or once a week, then daily or weekly backups are fine. But if you have an employee sitting at a PC most of the day inputting accounting data, consider making backups during the lunch hour, then again at the end of the day.

And don't keep making backups on the same set of floppies or the same tape cartridge. Instead, use a rotating system of at least three complete sets of backup media, always making the current backup on the *oldest* set. That way, should your computer go down while you're running the backup itself, or should you later learn that your backup is faulty and won't work, you'll still have at least two earlier sets of backup disks or tapes from which to restore the data and get up and running again.

XII

Arrange for off-site storage of your backup disks or tapes. Few PC users consider just how vulnerable their backups are to many of the same threats that imperil their primary data-storage records. A fire or flood wipes out backups just as surely as it destroys PCs and hard disks. It's easy enough to buy a new PC, but if your backup is rendered unusable, how are you going to get back in business?

Big corporations pay third-party security services to haul sets of backup tapes to odd and wonderful safe-storage repositories, from underground salt-mine vaults to tunnels under the Rocky Mountains to New Jersey warehouses. You can do that, too, though you probably won't like the price.

Why not just ask your bookkeeper to make an extra backup tape every Friday night and give it to you—then take that tape home and throw it in your sock drawer? The idea is to get that critical backup record off site, away from the same location as the PC itself and thus away from the same perils.

Taken together, these Twelve Commandments can save you a small fortune in lost productivity, a large fortune in lost financial records, and a few weeks' worth of lost sleep. Like PC-based accounting systems themselves, these rules set out a logical, safe path intended to deliver you to that state of business nirvana known as "being in control."

Without going *out* of control in the process. ◧

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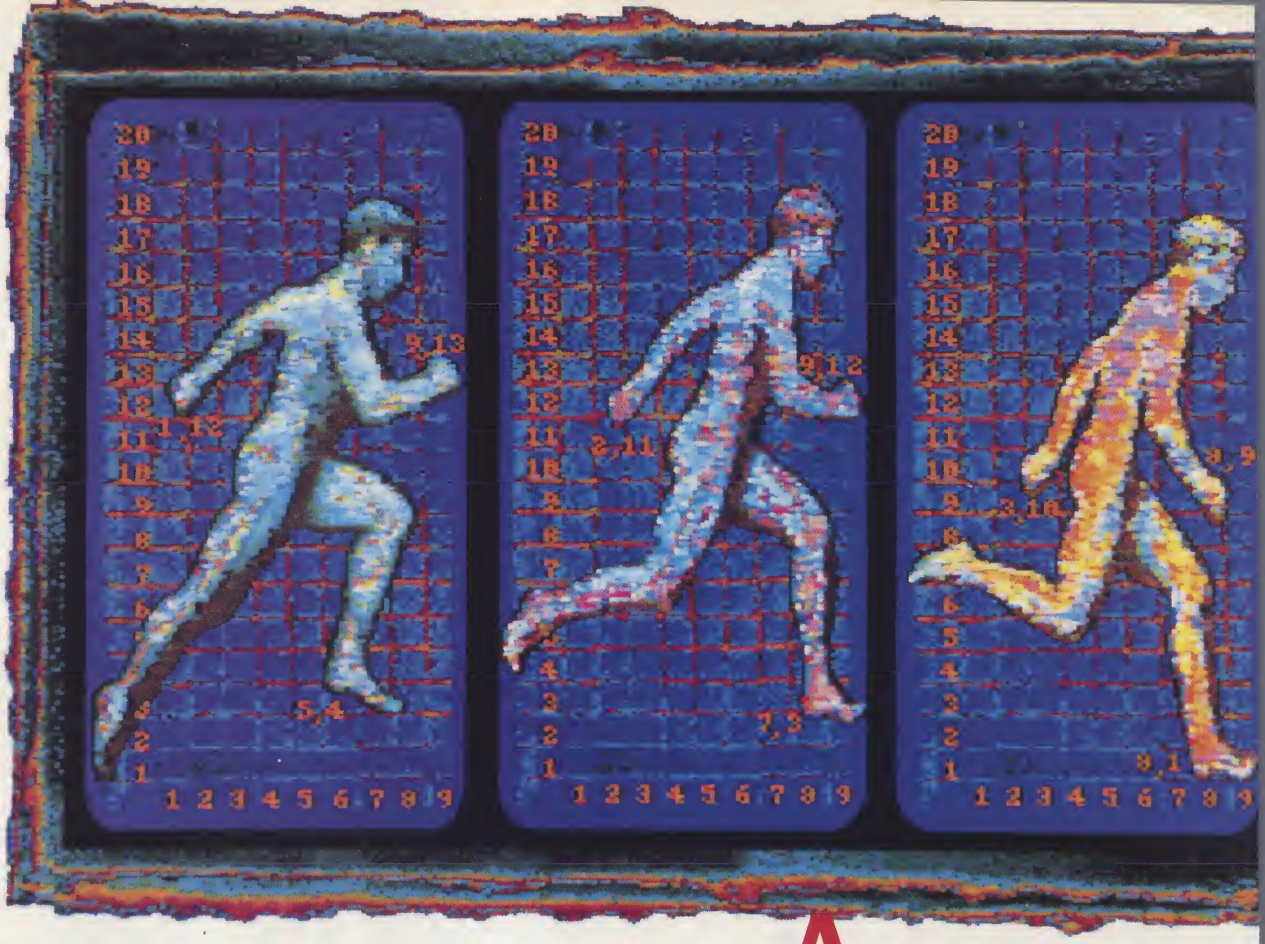

ZAP! POW! HYPE!

Math Chips!

Slick performers for special assignments, math coprocessors crunch numbers f-a-s-t.

By RANDY ROSS

Anyone else might be in for a tough day at the office, but armed with math coprocessor–equipped PCs, you don't even flinch. Flipping your cigarette butt into the water fountain, you stride into the neuroscience lab and flick on your PC. A reconstruction of a retinal nerve cell flashes on the screen. You spin the image 30 degrees for a better view of the synaptic connections, to see how the different cells interact. Using the coprocessor makes the process run three times as fast, leaving time for a quick espresso.

Next, you wander over to the shipping department for some linear programming. You need to construct the most efficient airplane flight path with stops in ten cities. Fingers flashing over the keyboard, you plug in a few variables and hit Return. The coprocessor crunches the numbers, figures some trigonometry, and spits out details of the route. You relax with a Chivas and water.

There's still plenty of time left before lunch to present the 3-D sketches for your new skyscraper. You've already drawn the structure and sketched plans for each floor, but you want to make a big splash at the client meeting. So, using your PC, you lead the obviously impressed client through a simulated tour, showing off the lobby and several floors from the perspective of someone strolling through the building. Though the simulation requires calculations to 11 decimal places, your coprocessor sends you and the client effortlessly through the maze. A

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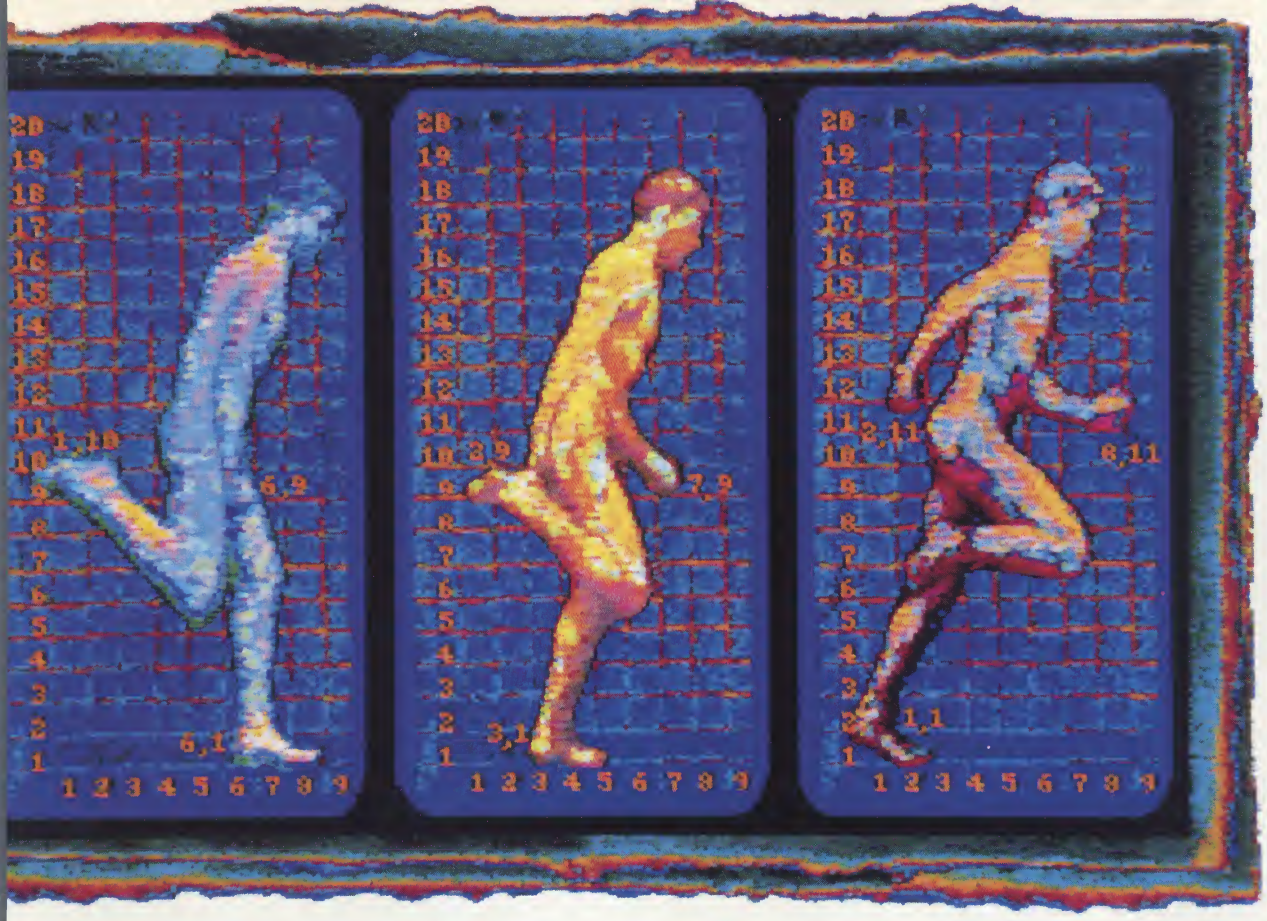

few minutes later, he springs for lunch at the Four Seasons.

That may not be anyone's typical morning, but it illustrates some of the common uses of math coprocessors, the fast, specialized chips that take over complex math calculations for a PC's central microprocessor. If you regularly encounter situations like those mentioned above, maybe you should shell out the cash for such an enhancement. List prices for coprocessors range from $167 to almost $2,400, but discounts of 30 percent are not uncommon.

If you lead a more mundane computing life—if you're not a scientist, financial analyst, or engineer, and you don't regularly use CAD/CAM, enormous spreadsheets, or statistical packages—a math coprocessor will probably add little to your PC's performance. A math chip won't make your word processor scroll faster, speed the creation of simple graphics, or ease delays in common desktop publishing. Some database programs that work with numbers may show improvements, but only minor ones.

Despite their relatively limited applications, however, math chips are beginning to move into the mainstream of personal computing. In the past two years, the number of software vendors that support math coprocessors has doubled, according to Rich Bader, a general manager of Intel's Personal Computer Enhancement Operation in Beaverton, Oregon. For instance, Lotus Development builds coprocessor support into every product whose performance would be enhanced by one. Ashton-Tate's dBASE IV, due out this fall, and OS/2's Presentation Manager, the new graphical interface from Microsoft and IBM, will be able to use math coprocessors. Apple puts one into every new Macintosh II. Both major math-chip manufacturers, Motorola and Intel, report steady sales growth. And Weitek, a leader in high-end math coprocessors, recently added a new PC model to its line.

These vendors know that math coprocessors serve a valuable function for users of math-intensive programs. Standard microprocessors, such as the 8088, 80286, and 80386 at the heart of IBM-compatible PCs, can perform only limited math functions, so they must send more complicated tasks back to the software program. There, a subroutine chops the problem into pieces the processor can handle, but this process slows math-intensive applications. If a math coprocessor is available, the central processor can delegate those tasks to the second chip.

Setting the Pace

Intel says its math coprocessors generally beat out software subroutines running on the CPU when working on addition and subtraction calculations involving five or more decimal places, multiplication or division problems with more than two decimal places, or any trigonometric, logarithmic, or square-root functions.

The 16-bit microprocessor in most older PCs adds,

subtracts, multiplies, and divides effortlessly but is slowed by numbers larger than 65,535. Newer 32-bit processors such as the 80386 can handle numbers up to 4,294,967,295. All standard microprocessors have trouble with "floating-point" calculations—that is, those involving decimals.

Math coprocessors contain the instructions needed to handle these problems, as well as other complex calculations involving square roots, trigonometry, and logarithms. Constants such as pi, *e*, and absolute zero are also burned into the chips, helping them perform many calculations 50 to 100 times as fast as a software routine running on a standard chip.

Of course, the increase in speed applies only to the actual calculations; the acceleration of the application as a whole depends on how math-intensive the program is. For instance, a database management program for payroll may produce results only about one and a half times as fast with a math chip because sorting functions and other routine operations must still pass through the regular microprocessor at the usual speed.

A coprocessor also can boost the performance of complex drawing and CAD packages; many such programs require one. Computers typically use mathematical algorithms to draw figures. To generate a circle, for example, the computer pulls up a routine that requires two pieces of data: a center point and a point on the circumference. Using mathematical calculations, the routine identifies other points that are the same distance from the center.

Generating circles for pie charts or rectangles used in bar graphs requires only simple math, which would benefit little from the addition of a math coprocessor. But three-dimensional scale drawings of a skyscraper, for example, require very complex calculations and many decimal places of accuracy. The ability to rotate sketches also requires complex math, because the computer must move every line while maintaining the proper relationship with the lines around it. Autodesk's $3,000 AutoCAD package, one of the most popular CAD programs on the market, can calculate to 14 decimal places. Math coprocessors can make a big difference in these cases.

Randy Ross is an associate editor of PC/Computing.

Matching the Hardware

Speeding math calculations requires more than just plugging in a chip. First, the computer must be designed to accept one. Second, the math chip must be correctly matched to the main microprocessor. If the math chip runs slower than the main microprocessor, it may do little to boost calculation speed. (A faster math chip will improve speed somewhat but will be held back by the central processor.)

That's why math coprocessors come in an array of styles and price ranges. For IBM and compatible machines, Intel makes 8087 chips for 8088 and 8086 CPUs, 80287s for 80286 CPUs, and 80387s for 80386 processors. Each family of math chips comes with clock speeds to match the corresponding range of microprocessors. For example, the 8087 is designed specifically for use with 8088 chips running at 5MHz or less. The 8087-2 can run with 8088 or 8086 chips operating at up to 8MHz. The 80287-10 complements 80286 CPUs running at 10MHz and up (see chart).

Matching the coprocessor to the microprocessor assures optimal performance and saves money; 8087 chips list for $167 to $330, 80287s range from $260 to $450, and 80387s cost anywhere from $750 to $1,395.

Which Math Chip to Use

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8088 or 8086	8MHz or less	8087-2	239
8086	10MHz or less	8087-1	330
80286	6-8MHz	80287	260
80286	8-12MHz	80287-8	385
80286	10MHz or more	80287-10	450
80386	16MHz	80387-16	750
80386	20MHz	80387-20	1,095
80386	25MHz	80387-25	1,395
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Each of these chips simply plugs into a socket in the computer's motherboard.

With a socket adapter, 386-based IBM-compatible machines can use coprocessors from Weitek of Sunnyvale, California. These chips run at double or triple the calculation speed of Intel's math chips, but again, the overall improvement depends on the complexity of the math calculations and how big a role they play in the application as a whole. Weitek's latest PC product, the $2,400 Abacus, has one version that runs at 20MHz and another at 25MHz. Weitek recommends the Abacus for CAD uses, such as finite element modeling, which can, for example, determine how much heat and mechanical stress the latest shock-absorber design will tolerate. A more common use would be for financial modeling, such as applying regression analysis to detect historical trends and forecast stock and bond performance.

Weitek PC products have been slow to catch on because many software programs do not support them, but that may be changing. The company's new chips are built to work in tandem with an Intel 80387. Some users install both coprocessors because many older programs are not compatible with the Abacus. Last June, 20 software developers announced the availability of Weitek-compatible high-end applications. Weitek anticipates that spreadsheet manufacturers will announce support for its chips early next year.

For Macintosh users, Motorola makes two math coprocessors, the 68881 and the new, faster 68882. Sales of these chips have been increasing steadily. The company sold 50,000 units of the 68881 in 1985, when it was introduced, and about 400,000 units last year, says Jeff Nutt, technical marketing manager at Motorola. Some of the increase was due to Apple's decision to include a 68881 as standard equipment in the Macintosh II.

Speedy Alternatives

Math coprocessors can speed up some calculation-intensive programs, but for many day-to-day applications, there are more effective ways to make your PC run faster.

• **Get more memory.** "The best way to boost performance is to boost memory and enhance memory management," says PC consultant Alan Kaplan, president of American Index Systems. Kaplan recommends an add-in board with 2MB of RAM. A PC accesses data from RAM in microseconds (millionths of a second). Even the fastest hard disks take milliseconds (thousandths of a second) to deliver the desired information.

RAM boards are available from many vendors in a variety of sizes. Unfortunately, however, semiconductor prices have skyrocketed in the past year. A 2MB AT add-on board from Tall Tree Systems that cost $650 a year ago, for example, costs $1,250 today.

In addition, to handle more than 640KB of RAM in DOS, either use a memory management tool, such as a disk caching program, or configure the extra memory as a virtual disk, or RAMdisk, using DOS's Vdisk.sys command.

• **Install a caching program.** Instead of adding more memory with chips, you can make better use of the memory already on your machine. Caching programs take data from disk storage and put it into RAM, where it is available much more quickly. A caching program saves data pulled from disk storage, anticipating that you may want it again. For example, if you are working on a ten-page document and switch from page 1 to page 8, the program will keep page 1 in RAM, ready to be called back. Without a caching program, most software writes that data back to the disk, where it will take longer to retrieve it. Caching programs cost about $75 from companies such as Paul Mace Software of Ashland, Oregon, and Peter Norton Computing of Santa Monica, California. Many newer personal computers come bundled with a caching program.

• **Buy a faster hard disk.** Slow hard disks of the sort used in older-model IBM PC ATs may take a turtlelike 80 milliseconds to access data. Today's faster hard drives can cut access time to 28ms.

To upgrade an older machine, you may also have to purchase a $70 hard disk controller, which manages the faster drive. Scherstad Systems of Bloomington, Minnesota, sells a 28ms, 40MB Seagate Technology hard drive, including controller, for about $695. The Micropolis Corporation of Chatsworth, California, also makes a hard drive in this size and speed range.

• **Use a print spooler.** Probably the least expensive turbocharging option, print spooler programs allow you to print and work on your PC at the same time. Typically, a printer takes a small chunk of data out of RAM, prints it, then grabs another chunk and prints that. Meanwhile, you can't use your PC to do anything else. Spooler programs set up storage space in RAM for larger chunks of data and spoon-feed smaller ones to the printer, leaving the PC free to perform other functions. These programs are often available as public domain software or come free when you buy additional memory. The retail price for commercial versions, such as PrintQ, from Software Directions of Randolph, New Jersey, is about $89. *—RR*

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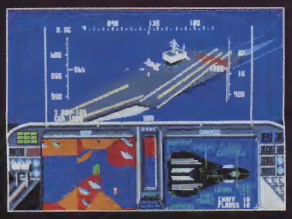

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Upgrading an older Macintosh, however, is more complicated than merely plugging in a new chip. Users who want to put a math chip in a Macintosh SE must buy an entire upgrade board, such as the $1,295 accelerator board from Radius of San Jose, California, which includes a more powerful central processor as well as a 68881 chip.

The Software Question

Once the hardware is in place, math chips need software that can take advantage of them. Some engineering, scientific, and mathematical programs, such as Autodesk's AutoCAD, require a math coprocessor because they make calculations so complex that the main processor may take hours to handle them. Many other math- or graphics-intensive programs, such as MathSoft's MathCAD (Releases 1.1 and 2.0) and SPSS/PC Plus from SPSS, Inc., both of which use complex algorithms to generate images or solve problems, automatically check for the presence of a coprocessor and, finding one, use it.

A number of operating systems and programming languages—including the OS/2 Presentation Manager from IBM and Microsoft, Borland International's Turbo Pascal, Turbo Basic, and Turbo C, FORTRAN 77 from Genesis Microsystems, and Microsoft's FORTRAN, Pascal, C, and QuickBASIC—are also designed to use a math chip. Programs that have limited math requirements or are not programmed to use a coprocessor may not even know the chip is there and obviously will not be able to take advantage of it.

Different programs use the math chip to different degrees. Statistical packages, for example, tend to like math coprocessors. SPSS, the maker of SPSS/PC Plus, a popular statistical package used for everything from basic cross-tabulations to multivariate analysis, strongly recommends a math coprocessor. In an SPSS test routine, a math coprocessor cut calculation time on an IBM PC-XT from 38 minutes to 9 minutes, on a PC AT from 8 minutes to 2 minutes, and on a PS/2 Model 50 from 7 minutes to 90 seconds. Jon Peck, SPSS vice president, adds that the time saving users can expect depends on what type of procedure they're doing. Many functions of a statistical package involve nonmathematical procedures such as shifting and manipulating data.

Math-intensive spreadsheets can also see real, if less spectacular, benefits. Lotus 1-2-3 (Release 2.0 and later) and Symphony (Release 1.1 and later) support math coprocessors. The software will check for the presence of one and use it with spreadsheets containing decimal points, including dollars-and-cents amounts. These applications will run faster with a

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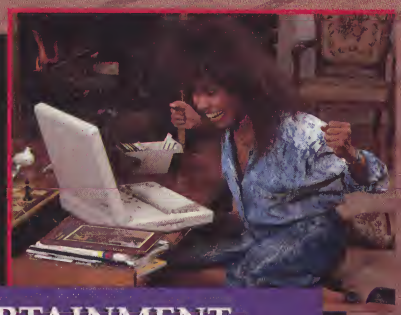

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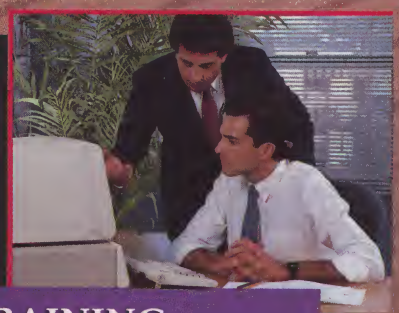

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math coprocessor, but the improvement is relative. "If people find that recalculation time is getting in their way, and they spend a lot of time twiddling their thumbs and staring out the window, a math coprocessor may be worth it," says Edward McNiney, a principal engineer at Lotus. But if recalculation takes only 20 seconds, saving 15 seconds may not be worth the extra $300.

Although Apple made a math chip standard on the Mac II, IBM and Compaq probably won't follow suit right away.

Even high-end desktop publishing programs generally don't get much from a math coprocessor. Interleaf's 386-based desktop publishing package, IBM Interleaf Publisher, can use a math chip, but the company does not generally recommend one. "For most desktop publishing applications, you are better off letting the software do the work," says Kevin Osborn, senior software engineer at Interleaf. Math chips are useful, Osborne says, when constructing three-dimensional images. For two-dimensional graphics, the software algorithms are faster.

And while database management programs such as Ashton-Tate's new dBASE IV and Borland International's Paradox support math chips, they derive only marginal benefits from them. Ashton-Tate spokesman Knox Richardson explains, "A math coprocessor can improve the speed of math calculations by two to three times, depending on how much math is in the database." But the sorting and shifting around of data—the major functions of database management programs—do not involve math calculations.

Debate still swirls around whether the math coprocessor has arrived. Although Apple made a math chip standard on its Macintosh II, DOS leaders IBM and Compaq probably won't follow suit right away. They want to avoid the added cost to consumers when the average computer user still doesn't need one. Peter Norton, author of *Inside the IBM PC,* clearly agrees with that strategy: "I think a math coprocessor, except for a few special people, is a 'so what, who cares,' because a lot of software won't bother trying to make use of it and most machines don't even have one."

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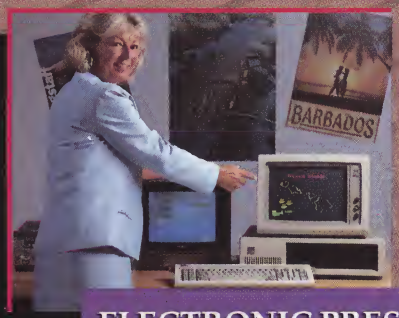

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The Paper Chase

Scanners transport graphics from paper to PC with ease, and they're getting better at text.

By PHILLIP ROBINSON

If you draw a diagram that shows how information gets into and out of a personal computer, there's a blank spot. Computers can read information electronically, from a modem, network, or disk, and they can write (or send) information those same ways. But when it comes to "hard copy"—information on paper—it's pretty much a one-way street. Almost anyone's computer system can dish it out, using a printer or plotter, but few can take it in.

Getting text from paper to computer yields to the brute-force method: typing it in. Not an elegant solution, but effective.

Graphic images are tougher. You could trace a drawing with a mouse or tablet, but that wouldn't be very precise and wouldn't preserve important information such as color and fill patterns. How can you get the computer to take over this chore?

That's where optical scanners come in. They start with a printed piece of paper and transform it into information in RAM or on a disk. In fact, they aren't limited to working on pieces of paper. They can look at a page in a book, a picture, or a drawing and convert the contents into the 1s and 0s that a computer can manipulate.

Scanners aren't new, but until recently they've been too expensive for most personal computer systems. Now prices have fallen below $2,000 for scanner hardware and software. That blank spot in the information-flow diagram is starting to be filled in.

Will the scanner become a necessity? Well, necessity is in the eye of the beholder: there was a time when cassette tapes were the standard storage medium for personal computers and floppy disk drives were an expensive luxury. Scanners do two things well: graphics scanning and optical character recognition, or OCR. Either one would be enough to push scanners toward every desktop that holds a PC.

Graphics scanning makes it easy to get drawings, pictures, charts, signatures, and other images into the computer. The passion for desktop publishing has made scanning a hot topic for all those folks who want to include artwork in a document—and the power of the current generation of word processors makes every document, even the most straightforward letter, a candidate for desktop publishing.

OCR scanning is still a brute-force method for getting text into a computer, but at least it uses the computer's brute force and not yours. Optical character recognition depends on graphics scanning—the scanner reads the light and dark areas on a page and stores an image of them as a computer file. OCR software then interprets those patterns of light and dark as letters and numbers. When you buy a scanner for your PC or Mac, you'll discover that the basic unit is made for scanning graphics, and that by purchasing optional OCR software (which is available for most scanners these days), you can also add text scanning to your repertoire.

PHOTOGRAPHS BY WALTER BIBIKOW

Flatbed versus Edgefeed

Scanners, like people, come in all shapes and sizes. The two most common types are "edgefeed" and "flatbed." An edgefeed scanner accepts one page at a time, rolling it past the scanning head just the way most printers feed paper past the printhead. A flatbed scanner looks a lot like the typical copying machine: it has a flat glass surface on top of the scanner and a hinged cover on top of that. To scan a page, you lay it on the glass.

The trade-off between the two types is flexibility versus convenience. A flatbed scanner can handle pages from magazines, books, or other bulky sources, but it must be fed by hand, one page at a time. An edgefeed scanner works only on loose sheets, but it does so automatically, feeding individual sheets from a bin. Most flatbed scanners now accommodate an optional document feeder that will do the same thing, so flatbed scanner technology appears to be winning out. All four of the scanners reviewed for this article are flatbed *models.*

A third major type of scanner, called an overhead scanner, looks somewhat like a photographic enlarger

Abaton Scan 300/FB

List Price: Mac version, $1,495; PC version, $1,795.

Requires: IBM PC XT or AT running at 8MHz or less with 2MB of extended memory; hard disk recommended. Macintosh with SCSI interface and at least two 800KB disk drives or one hard disk (recommended). Runs only on monochrome monitor.

Abaton
48431 Milmont Dr.
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or a transparency projector. In these machines, the scanhead is positioned above a platform, with lights on either side. Overhead scanners aren't as precise as flatbed or edgefeed scanners for flat artwork or printed text, but they can handle three-dimensional objects.

Although most scanners are desktop units—about the size of a printer or small photocopier—a growing number of much smaller, handheld devices is coming onto the market. Handheld scanners are compact and inexpensive because they depend on the user's muscle to move the artwork past the scanhead. But they scan only a narrow strip, and user muscle is notoriously unreliable—the output of a handheld scanner can't match the quality of a flatbed or edgefeed scan.

The last type of scanner hitches a ride on a printer, taking the place of the printhead or ribbon cartridge and scanning pages as they feed through the machine. The ThunderScan for the Macintosh pioneered this class of scanner. Like the handheld models, they're inexpensive because they don't include all the parts to move the page. Unlike handheld scanners, they scan a full page, but their major advantage is low cost; they can't match the sharp, high-resolution scans of conventional scanners.

Datacopy 730

List Price: $1,800.

Requires: IBM PC or compatible (AT recommended) with Microsoft Windows, 640KB RAM, and a 10MB hard disk. Also available for Macintosh Plus, Mac SE, or Mac II with at least 1MB memory and a 20MB hard drive.

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More Mechanics

Resolution is one major factor to take into account when choosing a scanner. Resolution indicates how often the scanner samples the image on the page, as measured in samples per inch, or dots per inch (dpi). The more dots, the higher the resolution and the higher the quality of the image, with smoother lines and more accurate reproduction of the original. A resolution of 300 dpi is what you'll find on almost any edgefeed or flatbed scanner these days (300 dpi just happens to match the resolution of most laser printers). Most scanners also allow you to scan at lower resolutions to save time and storage space (a large graphic image scanned at 300 dpi means a large file).

The scanner interface is important, too, even though it's a straightforward topic: does it work with a Macintosh or with a PC? Many scanners today can do both but need different interface cables and cards for the different systems. Mac scanners often connect to the Mac's fast SCSI port; PC scanners come with parallel interface plug-in cards.

The issue of speed often pops up in scanner reviews, but it isn't really very important unless you're planning on scanning reams of documents. Scanners typically require 10 to 20 seconds per page for the mechanics of the scan, in addition to software processing time for storing and formatting a file. OCR scans and processing can often take half a minute or more per page.

Phillip Robinson, an engineer, writes for several computer magazines and edits Desktop Engineering News.

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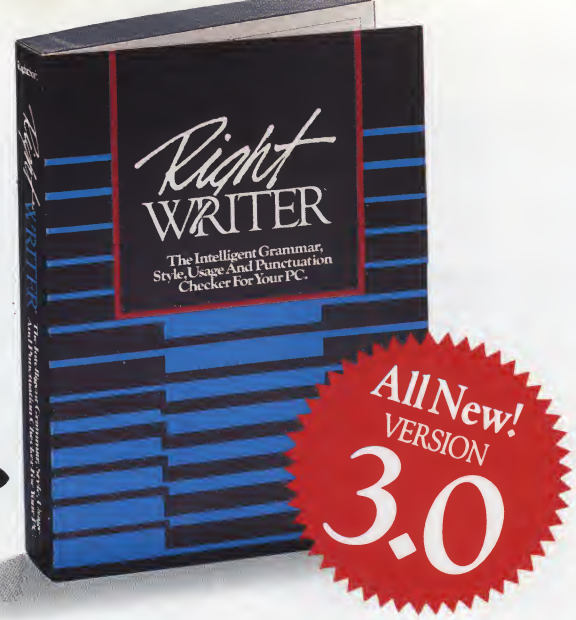

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The Original Text...

```
There is a problem of a severe nature in widget production.  It is clear that
our current system will not cut the mustard.  We may possibly need to move on
this reasonably quickly.   To start, it would be advantageous to see if a new
design is doable.  (This should be looked into at once.
```

...RightWriter's Analysis

```
There is a problem of a severe nature in widget production.   It is clear that
  <<* U12. WORDY. REPLACE problem of a severe nature BY severe problem *>>
                  <<* S14. CONSIDER OMITTING: It is clear that *>>^
our current system will not cut the mustard.  We may possibly need to move on
        <<* S16. CLICHE: cut the mustard *>>^
            <<* U13. REDUNDANT. REPLACE may possibly BY may *>>^
this reasonably quickly.   To start, it would be advantageous to see if a new
                          ^<<* S17. WEAK: reasonably quickly *>>
  <<* S13. REPLACE advantageous BY SIMPLER helpful or good? *>>
design is doable.  (This should be looked into at once.
     <<* U16. NOT A WORD. REPLACE doable BY can be done *>>
                        ^<<* P11. IS THIS PARENTHESIS CLOSED? *>>
     <<* S1. PASSIVE VOICE: be looked *>>^


                        <<** SUMMARY **>>

     Overall critique for: C:\RIGHT30A\newtest.
     Output document name: C:\RIGHT30A\newtest.

READABILITY INDEX: 5.23

     14th       12th       10th       8th        6th        4th
      |****|****|****|****|****|****|****|****|****|     |
     COMPLEX                |-------GOOD--------|        SIMPLE
     Readers need a   5th grade level of education.

STRENGTH INDEX: 0.78

     0.0                        0.5                        1.0
      |****|****|****|****|****|****|****|**  |     |     |
     WEAK                                               STRONG
     The strength of delivery is good, but can be improved.

DESCRIPTIVE INDEX: 0.27

     0.2            0.5                        1.0       1.2
      |****|****|****|     |     |     |     |     |     |
    TERSE            NORMAL                   OVER DESCRIPTIVE
    The use of adjectives and adverbs is in the normal range.

JARGON INDEX:  0.00

SENTENCE STRUCTURE RECOMMENDATIONS:
            2. Few compound sentences or subordinate
               clauses are being used.
           14. Many prepositional phrases are used.

                     << WORDS TO REVIEW >>
Review this list for negative words (N), jargon (J),
colloquial words (C), misused words (M), misspellings (?),
or words which your reader may not understand (?).
   ADVANTAGEOUS(J)  1                    DOABLE(J)  1
            NOT(N)  1                    SEVERE(N)  1
         WIDGET(?)  1
                << END OF WORDS TO REVIEW LIST >>
```

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Graphic Details

As far as scanners are concerned, graphic images come in four types: line art, halftone, gray scale, and color. Line art is just a black-and-white image and is the easiest to scan. Any image with shades between black and white can only be scanned decently in halftone or gray-scale modes.

The scanner halftone is similar to the halftones in magazines and newspapers, which print smaller black dots for light grays and larger black dots for dark grays. Computer printers, however, can print only a single dot size. To accommodate them, a scanner can group the dots it scans into sets of four or more, called grains, and then print all, some, or none of the dots in a grain, depending on how dark that area should be.

Every scanner can handle halftone images, which don't require any more storage space than line-art images do. Halftone scans do trade some resolution in order to get all those shades of gray. A 300-dpi scan digitized for five shades of gray would print at 150-dpi resolution; with 256 halftone grays, it would print at only 30 dpi.

Gray-scale scanners save more information about

How Scanners Scan

Scanners are based on a simple physical principle: black absorbs light and white reflects it. Each scanner contains a light sensor of some kind—in most cases a special kind of chip called a charge-coupled device (CCD) or an array of photodiodes, each sensitive to light. In fact, each CCD is itself a rectangular array of microscopic light sensors, side by side.

The light that falls on each sensor is converted into an electrical voltage. The more light that falls on a particular sensor, the higher the voltage from that sensor. Light that reflects from the object or document to be scanned is directed at the CCD. If one sensor on that CCD is struck by light from a white area, it will have a high voltage. A sensor struck by the smaller amount of light that does manage to bounce off a dark area of the object or document will have a low voltage.

The various voltages from all the CCD sensor elements can then be read by an electronic circuit and stored as a collection of numbers, each number representing a position on the CCD and a particular voltage. (This same scheme with CCDs, incidentally, is employed in some of today's giant telescopes to see distant objects far too faint to be discerned by the human eye.)

The values from an array of photodiodes can be treated the same way. Most of today's scanners pick up values for 300 points or dots per inch—90,000 dots per square inch of a document. Most also offer the ability to scan at a lower resolution, picking up fewer points but getting the job done faster.

The electronics within the scanner can then interpret the voltage values from the photosensor. Some scanners understand only "continuous-tone" information—black and white. They decide if each point is dark enough to be black or light enough to be called white and store the information that way. Gray-scale scanners can interpret the voltage values with more precision, assigning a variety of gray levels to the assorted intensities of light that strike the photosensor.

Color scanners have even more information to work with, scanning a document through various filters to determine the intensity of each component color, working with the equivalent of several gray-level values for each point. The collection of scanned values is converted into bits that make up an image. The image can then be stored, manipulated by software, displayed (showing black and white, gray intensities, or colors on a screen), and printed.

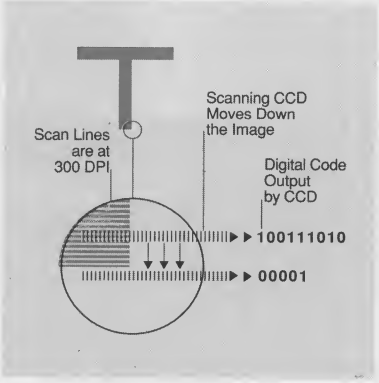

ILLUSTRATION BY BRUCE SANDERS

Just how do you bounce the light off the scanned object and onto the sensor? You can use background light, but that may not be bright enough to adequately and quickly energize the CCD or other light sensor, so most scanners have their own bright light source to shine on the scanned object.

And how do you focus the image of the object or document on the CCD or sensor? You can use lenses and various optics to send the entire image to the chip at once. Or you can cut down on optics costs and use a smaller photosensor that scans only part of a document at a time. The typical way to do this is to scan horizontal lines of the document, storing the light and dark information from a single line, then moving to the next line down and scanning it. Handheld scanners depend on their users' muscle power to move the photosensor across a document.

Finally, there's the software angle. Many scanners let you adjust the brightness, contrast, resolution, and some other aspects of a scan, either through hardware switches or through software commands from an attached PC. But most image manipulation is done by the computer, not by the scanner. —*PR*

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each dot on a page. The resulting files are larger and take longer to manipulate, but they can be displayed and printed at full resolution with multiple levels of gray on a typesetter or other sophisticated printer. For professional publishing, that's a must. Gray-scale scanners and editing software are more expensive than comparable hardware and software for handling straight line art, but the price difference is much smaller than it used to be.

Color scanners do exist, but they're still as rare as color printers. Color images can be scanned by gray-scale scanners, just as color TV shows can be seen on a black-and-white set.

Hewlett-Packard ScanJet

List Price: $1,990.

Requires: IBM PC XT or AT, IBM PS/2 Model 50, Model 60 or Model 80, or Hewlett-Packard Vectra or compatible with 640KB RAM and a 20MB hard disk. Also available for Macintosh Plus, Mac SE, or Mac II.

Hewlett-Packard
19310 Pruneridge Ave.
Cupertino, Calif. 94014
800-752-0900

The Difficulty of OCR

Optical character recognition is as difficult a technical problem for a computer as it is simple for a human. Computers are confused by differences in the size, style, shape, darkness, angle, and position of letters and numbers. New software techniques for pattern recognition, along with higher-resolution scanners and more powerful PCs to run that complicated software, have dramatically lowered the cost of OCR—and dramatically increased its accuracy and effectiveness.

OCR software can look directly through a scanner at a page, or look at a saved image file, and convert it to text by comparing each dark area of the page to known letter and number shapes. Some text, such as the proportionally spaced type in newspapers and magazines, still eludes most PC-level software, but OCR software can read mono-spaced text (with all the letters the same width), such as typewritten business documents, with ease.

Like human readers, scanners do make mistakes. However, the mistake rate is far lower than it was just a few years ago, when a single page could contain dozens or even hundreds of missed or wrong characters. Current OCR software can flag questionable characters for checking and boasts an accuracy rate comparable to that of a good typist. With formatting features and utilities, the programs also have the ability to place the text or numbers in computer files just as they appeared on the original page or spreadsheet.

(continued on page 172)

On the Other Hand: Small Scanners

While the full-sized scanners for graphics and optical character recognition have grabbed the limelight, a growing crop of scanner devices are small enough to be held by hand.

Handheld scanners are to their larger relatives as notepad and sketchbook are to ledger and canvas. Handheld OCR models won't do the job of flatbed and edgefeed units, but they're great for capturing short pieces of text and numbers. And image scanners bring a new dimension to collecting clip art and spot graphics and illustrations.

Like using a mouse, hand scanning is not difficult to master, but a smooth, steady sweep across a document's pages is needed to avoid image and character distortion.

By far the simplest, easiest-to-use handheld scanner is the $295 Packard Bell PB-PS1000 Pocket Scanner. It takes no more than ten minutes to install and set up, and to capture a TIFF format image that can be pulled into just about any graphics, editing, paint, or desktop publishing program. With a maximum scan width of 2½ inches, the 200-dot-per-inch Pocket Scanner looks like an oversized mouse and has a standard set of controls for contrast and gray-scale dithering. It comes bundled with GEM Scan, a top-notch scanning and editing program.

The Complete Hand Scanner is a giant step ahead of the Pocket Scanner in sophistication. At $249, it has the right mix of form, function, and affordability. It operates at 200 dpi on images as large as 2½ inches by 10 inches. In addition to the standard formats, the Complete Hand Scanner software converts image files into formats suitable for use in Microsoft Windows, Dr. Halo II, and PC Paintbrush Plus. The software's editing features allow image scaling, cropping, and 90-degree rotation. What's more, the Soft Stationery option in its software makes the Complete Hand Scanner the only product in this category that can combine graphics with text in an image file.

The $299 ScanMan from Logitech brings color to the otherwise black-and-white world of hand scanning. Not that it scans in color—scanners scan only in black and white. But the ScanMan software supports the various color modes of graphics adapters (MCGA, EGA, and VGA) directly when used with Logitech's PaintShow Plus graphics software.

The 200-dpi ScanMan has a wider scan width (4 inches, with an 11-inch maximum depth) than the Pocket Scanner or Complete Hand Scanner, and its T-shaped scanhead gives more control and lessens the chance of movement distortion. PaintShow Plus is an advanced piece of software, with all the usual image-editing tools plus the facility to add color and save or convert the color file to PCX, TIFF, or MSP formats. The PaintShow Plus program also supports a variety of dot matrix and laser printers.

Handheld graphics scanners have a bright future in a world increasingly dominated by desktop publishing, but the outlook for OCR hand scanners is more problematic. They are difficult to use—the slightest deviation from a straight path across the page produces scrambled characters—and they read only one line at a time. With this in mind, the TransImage 1000 from Everex has the Saba Handscan beat hands down.

The unique design of the $2,950 TransImage scanner uses 4-inch-long rollers that make for a smooth glide. But what really puts it above the Saba is its ability to read proportional typeset material. The $799 Saba can recognize only printer output text and numbers, though it recognizes a full range of fonts from letter quality, mainframe, laser, and line printers.

Both these handheld OCR units require considerable setup, have a high learning curve, and lead you through a maze of menus to accomplish their basic task—doing away with reentering documents at a keyboard.

The 1,000-dpi TransImage accomplishes this chore in a technologically superior way by allowing for adjustment of exposures and updating its dictionary to recognize new characters and symbols as well as providing software bridges into popular business applications. The Saba Handscan first needs to be set for a specific font, or it will do a best-match search from a sample.

For picking up bits of printed material, these are wondrous pieces of hardware that can read text accurately. But the applications for one-line-at-a-time OCR are much more limited than those for handheld image scanning. —*Greg Pastrick*

Greg Pastrick is a managing editor of PC Magazine.

File Formats and Fax

OCR work results in text files, either in plain ASCII or in some particular word processor format. Graphics files are stored in any of several formats, the most common being TIFF (Tagged Image File Format, a desktop publishing standard), PCX (the format used by PC Paintbrush, a popular paint program), EPS (Encapsulated PostScript, for use with some PostScript-based programs), and IMG (used by Ventura Publisher and some other programs). Mac scanner software also deals with PICT and MacPaint formats.

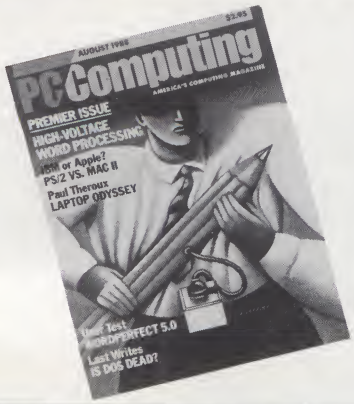
Most scanner software can convert files between at least a few of these formats. Some utility programs can translate drawing files from one of these formats into a CAD program format such as the DXF format made popular by AutoCAD.

Text files don't take up much disk space, but even a simple line-art graphics file can fill a floppy disk. If you begin adding gray-scale information, that file can grow as large as 4MB, and it doesn't take many of those to fill even a large hard disk. The compression routines found in some scanning software can help, but even they can't shrink some graphics files much.

A gray-scale scan file can grow as large as 4MB, and it doesn't take many of those to fill even a large hard disk. The compression routines found in some scanning software can help, but even they can't shrink some graphics files significantly.

Finally, there are fax files. Facsimile machines have been employed for a long time to instantly send documents over telephone lines, without the use of computers or computer modems. But a fax machine is simply a bare-bones graphics scanner combined with a specialized modem and a printer. Many companies are now offering PC add-in boards and modems that incorporate most of the functions of a fax machine. All you need to completely replace a fax is one of these boards, the right modem, a printer, and a

SMART Lively LITERATE



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■ Countless Uses

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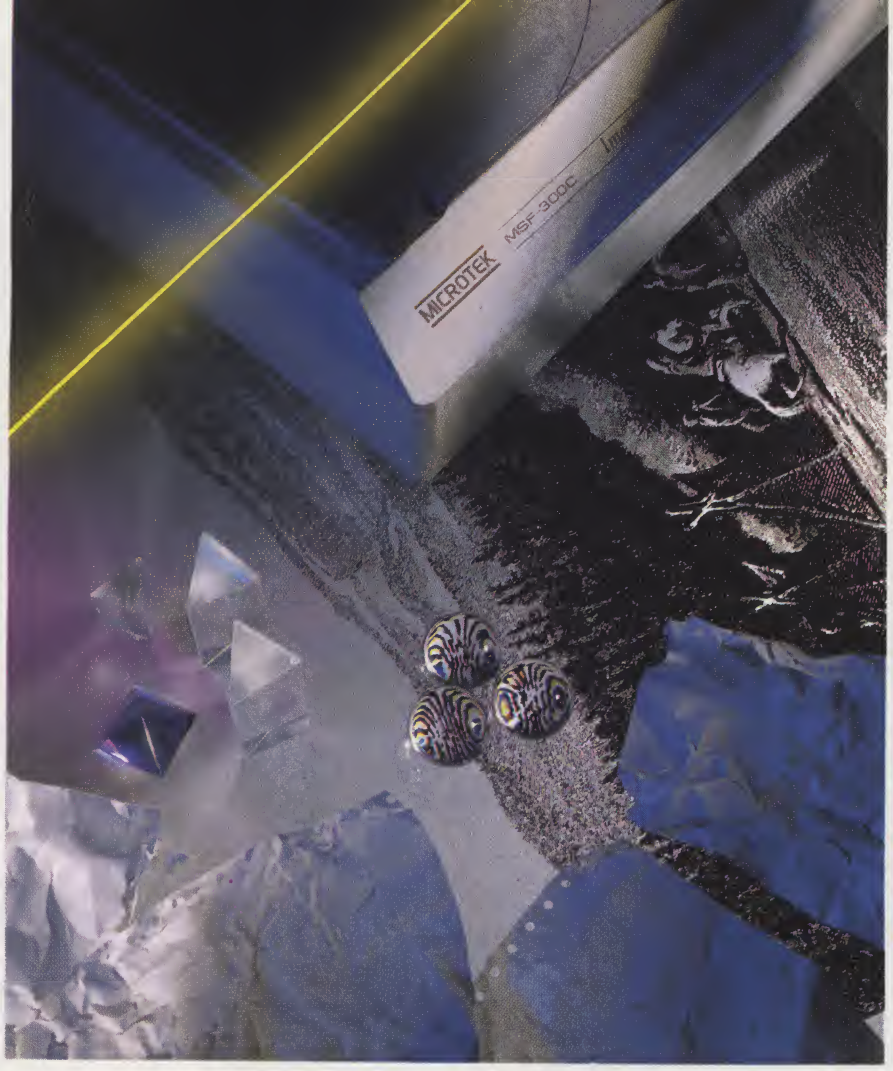

scanner. And with OCR software that reads fax files, a computer can even translate some fax messages into text files, something fax machines are not equipped to do.

Wave of the Future?

Does every computer system need a scanner? Probably not. Even if you're hooked on using a computer for lots of different tasks, you can probably get plenty of your graphics and text data from other people's disks, over a network connection, or from a bulletin board service. If you're an artist or desktop publisher, however, you may have already found yourself wanting a scanner to magically transport a magazine picture or a colleague's sketch into your paint or draw program.

OCR can seem a less clear-cut decision. Most of us learned to do without that automated text-reading ability because it just wasn't possible. Now that it is, and can be had as a software addition to a basic scanner system, perhaps the idea of hard copy input will catch on. OCR software still cannot read several entire categories of documents, and the process requires more attention and manual error correction than graphics scanning programs need, but in some cases it can beat the pants off of retyping piles of documents.

The absolute, ultimate living end will be the peripheral that combines a laser printer, personal copier, and PC fax machine with graphic and OCR scanners. It would be a one-stop solution for all the blank spots on the information-flow diagram—and the ultimate personal computer luxury. But don't hold your breath. Even if it were technologically feasible, the price of such a device would keep it out of the "necessity" category. But of all the pieces of that dream machine, the scanner looks as if it will become an affordable necessity the soonest.

Microtek MSF-300C

List Price: $1,695 (PC version), $1,795 (PS/2 version), $1,595 (Macintosh version).

Requires: IBM PC, PS/2, or compatible with 640KB of RAM and a hard disk. A mouse is recommended for manipulating the Windows-based software.

Microtek Lab, Inc.
680 Knox St.
Torrance, Calif. 90502
800-654-4160
213-321-2121

Abaton Scan 300/FB

Abaton's Scan 300/FB is a fairly compact and capable flatbed, gray-scale graphics scanner that can run with a PC or a Mac. It's inexpensive—$1,495 with the software for the Macintosh version we tested. But at this price there are things it won't do: it won't scan legal-size documents, for instance. Still, it offers a scan resolution of 300 dpi and can capture images as line art, halftones (in spiral or random dot placement), or 4-bit gray scale (which allows for 16 levels of gray). The 300/FB is shorter than the Microtek or ScanJet models that we also review here, but it looks almost identical to the Datacopy 730.

The simple diagrams and clear instructions that came with the scanner had me hooked up and ready to run in just a couple of minutes, quicker than any of the PC scanner installations I tried. It connects to the Mac through a SCSI (Small Computer Systems Interface) port, which means it can transfer scanning information very quickly. To run the 300/FB with a PC, you'll need a separate option kit that has an interface card and some PC software.

Two software packages come with the Scan 300/

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SOTA 286i benchmark was run on IBM PS/2 Model 30.

CIRCLE NO. 210 ON READER SERVICE CARD.

FB Macintosh package: Panel Scan and C-Scan Plus.

Panel Scan works from the Mac's Control Panel desk accessory to set basic scanning parameters, scan a page, and then save the scanned file. Panel Scan can set the type of scan (line art, random halftone, spiral halftone, or gray scale), the reduction (100, 80, 66, or 60 percent), the brightness (16 levels), and what type of file to save the image in: TIFF for desktop publishing, EPS for PostScript programs, MacPaint for standard Mac graphics, or CCITT/3 compressed to save space.

C-Scan Plus is a small standalone program that does what Panel Scan does and adds some image-editing features for moving, viewing, trimming, and making additions (text, circles, lines, fills, and so on) to an image on the screen.

The Scan 300/FB is very easy to use, with excellent manuals, simple software, and HyperCard stack tutorials for both Panel Scan and C-Scan Plus. It has its problems, though. Aldus FreeHand and C-Scan Plus fight with each other and can freeze a Mac. Abaton tech support people are easy to get on the line; they say that both programs are "memory hungry" and start duking it out over who gets what RAM—an explanation, but not a fix. The scanning programs eat up hard disk space—temporary work files balloon the size of the system folder.

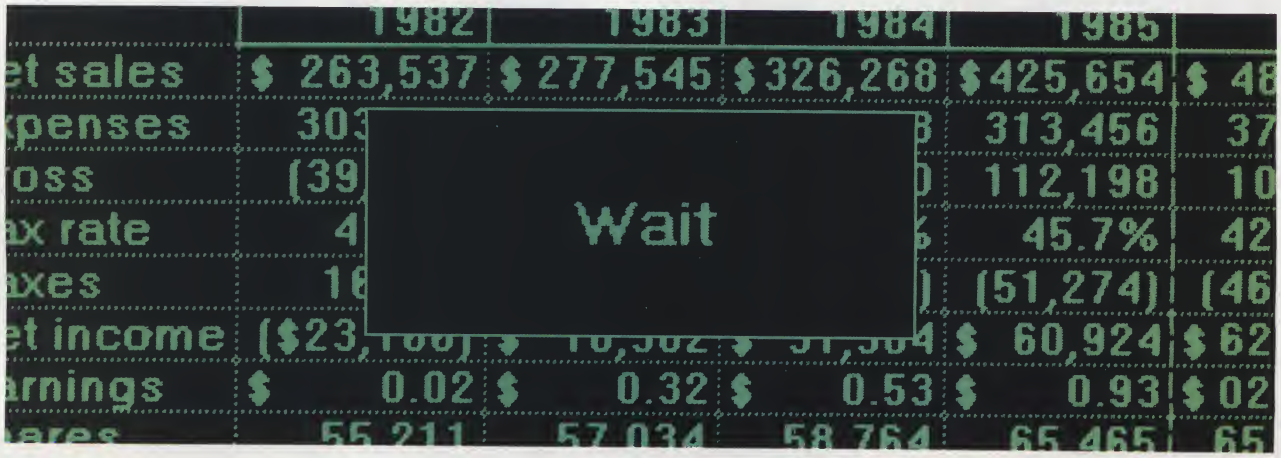
The quality of graphics the 300/FB captures is good enough for simple desktop publishing tasks, but because the software cannot edit gray-scale images, the best scans the hardware is capable of making can't be inspected while operating the machine. Nor does Abaton yet offer a gray-scale editing program or an OCR program with the Macintosh version—though both are in development, and there is an OCR program for the PC scanner.

Datacopy 730

The Datacopy 730 we reviewed looks identical to the Abaton scanner, but it came with a PC interface card that plugs into a PC expansion slot. The 730 scans line art, halftone, or 16-level gray-scale images with a top resolution of 300 dpi. It's a flatbed scanner that accepts letter-size or A4 documents.

Graphics work with the 730 is handled by the PCImage program. Running under Windows, PCImage sets and directs the scanner and offers commands for editing an image. For some commands, this program offers more choices than the graphics programs for other scanners do. For example, contrast has five settings (normal, reverse, smooth, sharp, and linear). The scan type offers only two halftone modes (4-by-4 random or 4-by-4 spiral), while the Microtek software offers eight halftone

STOP WAITING ON TABLES.



With its strong OCR program and very flexible graphics software, the Datacopy 730 flatbed scanner is the standout for all-around use.

patterns and the HP software four. But once an image is in memory, PCImage can transform it into any of 16 halftone modes, and a sophisticated transformation called "error diffusion" improves the look of an image.

PCImage will edit an image pixel by pixel, but the program doesn't offer such editing tools as erasers, text editors, pens, and so on. To do that to an image it must be saved—TIFF, PCX, or Datacopy's IMG format are available—and edited in another program. (PCImage also reads PCX and FAX file formats and can compress TIFF or IMG files.)

Datacopy thoughtfully included a copy of PC Paintbrush Plus for just such editing work. This standalone program with its own menu structure (it doesn't run under Windows) has all the editing commands you might want. It can even be configured to directly control some scanners, including the Datacopy 730, though it has fewer options for setting the halftone mode of a scan than PCImage.

Datacopy's OCR and OCR Plus programs do a great job of converting scanned images into text. They can work on files in memory or read information directly from the scanner. OCR, the main program, reads a variety of fonts and saves files in a dozen word processor formats. (Datacopy also has a program to format OCR output for Lotus 1-2-3.) OCR works fast and quite accurately. It can be set to mark questionable characters or to ask for a judgment as it translates. OCR Plus is a training program that teaches OCR new fonts and type styles. Together, these programs should let you read most printer output, though they aren't sophisticated enough to match wits with some typeset copy, such as proportionally spaced text in newspaper clippings.

With this exceptionally strong OCR software and the great flexibility of the PCImage graphics software, the Datacopy 730 is the standout for all-around use among the machines reviewed here.

Hewlett-Packard ScanJet

A long, low flatbed scanner, the ScanJet can pick up 16 levels of gray and, with the right HP software, capture images at up to 600 dpi—twice the resolution of competing scanners. It handles documents up to letter or A4 size. The ScanJet connects to the PC

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through its own interface board, which plugs into an expansion slot on a PC or AT bus. (Although it was once a PC-only scanner, a Macintosh interface kit for the ScanJet is now available.) The ScanJet requires 640KB of RAM and a 20MB hard disk.

HP's documentation was the best of the four scanners we reviewed, and setting up the system took only a few minutes. The documentation includes a unique set of "application notes" that explain technical details on topics such as "dithering" and describe how to use the scanner and its software with other programs such as Ventura Publisher and PageMaker.

The software used with the ScanJet to capture and edit graphic images, called the Scanning Gallery, runs under Windows and offers four halftone settings along with gray-scale scanning. The Scanning Gallery is unusually flexible in its resolution settings: vertical and horizontal resolution can be set in 1-dpi increments. The program can read and write MS Paint, PCX (PC Paintbrush), TIFF, and GEM files and can convert files between any of those formats.

The ScanJet is a rather slow scanner, taking a few more seconds per page than average. But the Scanning Gallery does offer a Preview Scan option for a quick scan of the general image of a page. The software includes tools for cutting, cropping, and printing images, but you'll need another paint program to do any serious editing.

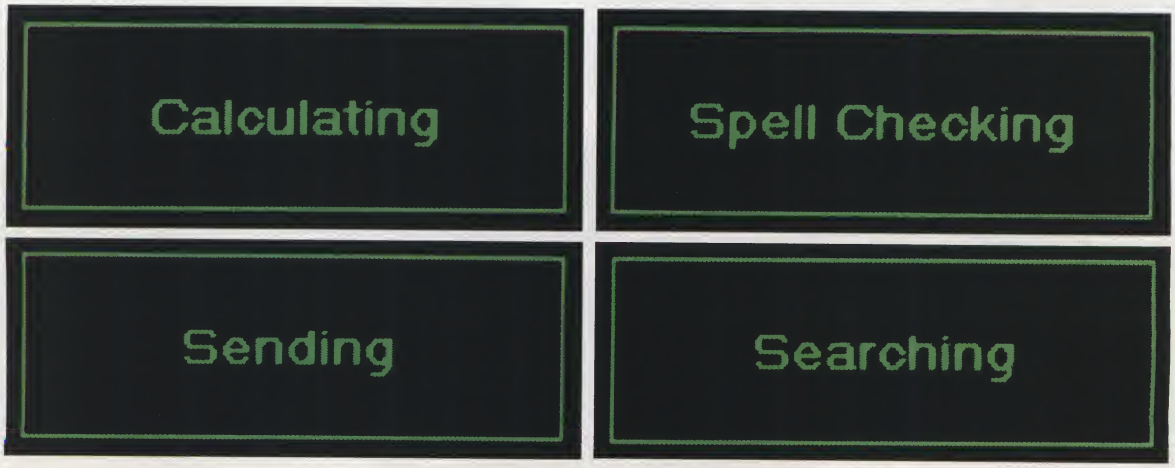
ScanJet came with the best documentation, with tips on how to use the scanner with programs such as Ventura Publisher and PageMaker.

Adding ReadRight, a program from OCR Systems, lets the ScanJet function as an OCR machine. (ReadRight also works with other scanners, such as the Microtek reviewed here.) The program recognizes a variety of type styles and point sizes, even if the fonts are mixed within paragraphs, and you don't have to specify what fonts it will encounter.

ReadRight is not advanced enough to read typeset text or poor photocopies, but it can directly format text for an ASCII, WordStar, or WordPerfect file. The program runs without the help of Windows or the Scanning Gallery, using its own menus for setting scanner functions. It can also read scanned graphics files from memory and perform OCR translations on them, although it has some compatibility problems here: ReadRight wouldn't recognize files from the Microtek or Datacopy scanners. (Apparently, not all TIFF files are created equal.)

For this and other reasons, ReadRight ran second to Datacopy's OCR program for text entry using a

DON'T JUST SIT THERE.



scanner. For graphics, the ScanJet is tempting because of its fine resolution control, its potential for 600-dpi scanning, and the availability of a Macintosh interface. But again, the Scanning Gallery software isn't as powerful as the programs for the Datacopy or Microtek scanners.

Microtek MSF-300C

Microtek scanners are a common currency in both PC and Mac territories, in both retail and OEM (original equipment manufacturer) sales. The MSF-300C is a flatbed scanner for the PC sold by Microtek under its own label.

This system is the longest of the three scanners reviewed for this article—it swallows legal-size documents as well as the letter or A4 size the other scanners accept. It comes with its own short parallel interface card, which fits the standard PC or AT bus, and a cable for connecting this card to the scanner. You'll need a hard disk and lots of RAM on the PC.

The 300C includes software called EyeStar Plus that runs under Windows. This program combines scanner controls with a monochrome paint program that's pretty thorough, though not as easy to use as familiar paint programs for the Mac or PC. At first, EyeStar Plus and the Microtek interface card didn't seem to want to work together, and the documentation wasn't much help. But Microtek's technical support folks were able to ferret out the trouble (conflicts with other cards in the test PC) and quickly suggested a solution.

EyeStar Plus saves files in TIFF, PCX (PC Paintbrush), Windows Paint, or its own format. The software has some problems: its commands were sufficiently confusing and the performance sluggish enough that editing images would probably have been easier with some other program.

The 300C can scan at resolutions of 75, 100, 150, 180, 200, 240, and 300 dpi, but it doesn't support actual gray-level scanning. It can, however, simulate up to 64 levels of gray scale through dithering.

The image scans from the 300C were satisfactory, but not sensational. The scanner doesn't come with any OCR software, but a version of ReadRight is available for the machine—the same OCR program used with the Hewlett-Packard ScanJet (though the software is customized for the individual scanners). ReadRight can analyze a variety of scanned images into text and format that text into ASCII, WordStar, or WordPerfect files. It's not as trainable as the OCR Plus program used by the Datacopy scanner.

The performance and usability of any scanner package depends on the sum of its parts—scanner hardware and functions, control and editing software. The Microtek is solid and capable, but it just doesn't offer as much as some others. ◪

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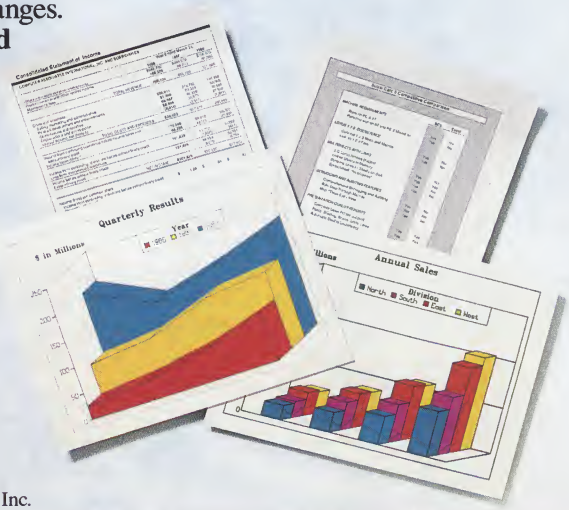

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ONE-STOP SHOPPING

Pick up a PC while cruising the mall. Just don't ask too many questions.

By DAVID DeJEAN

UP THE ESCALATOR, past Better Dresses on 2 and Children's on 3, through the pottery in Home Accents and there you'll find it—in a clearing between the Personal Electrics counter and the Sleep Shop.

A personal computer, an actual, functional MS-DOS computer, with two high-capacity 360KB disk drives, a full 512KB of RAM, a dazzling CGA color display, and an 8088 CPU that's a number-crunching behemoth running hard at 8MHz.

OK, maybe a department store isn't the place to look for state-of-the-art computer technology.

Ever wonder why department stores stock PCs? They do.

But who buys these machines, and why? I took to the road to find out. The problem was, I didn't.

The reason can't be that it's easy. It isn't.

Just finding a salesperson who knows anything about computers is an unexpected pleasure (finding a salesperson at all can be a surprise)—but then, the same can be said of most computer stores.

It can't be that the PCs are the latest technology at the lowest price. They aren't.

You'll find several department store computers on the market. These machines are specifically developed to be sold to individuals through retail channels. We took a look at four of them: the Amstrad 1512, the Blue Chip pcPopular, the Epson Apex, and the Vendex HeadStart.

The technology they employ is strictly 1983. The prices they go for (anywhere from $900 to $1,300) are good, but a sophisticated shopper willing to comb through classified ads and mail order listings can probably do better.

You generally get a sturdy piece of equipment for the price; 1983 technology is pretty well proved. You can get it fixed if it breaks; the manufacturers either have their own networks of authorized service centers, as Epson does, or they have arrangements with nationwide service organizations, like Vendex's contract with Honeywell Bull. And you generally get a usable package. Department store PCs usually come with some bundled software—menu programs to ease the novice user's first confrontation with DOS and applications like word processing to make the computer useful right away.

And if your credit limit is high enough, you can get three months to pay and no interest charges.

Macy's Machines

In better days the sign had read "COMPUTER STORE" in neon letters on the third floor of Macy's in Long Island's Roosevelt Field shopping mall. More recently the store's management had tacked the words "Home Office &" in smaller letters above

ILLUSTRATIONS BY EVERETT PECK

APPLIANCE SALE
FASHION
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it. This obviously wasn't a computer store anymore.

It was a personal word processor store. A dozen brands of hybrids—gizmos that tie together a keyboard and a screen with a bit of disk storage and a daisywheel printer—were spread across the counters. Some looked like electric typewriters with swing-up LCD screens. Others looked like bread boxes with printers in their tops.

Priced from $600 to $800, they represented a step backwards in the development of the computer—something more akin to the old Wang word processors or IBM Displaywriters than to PCs. They ran only one program, a more-or-less awkward word processor, and they had lots of dedicated function keys on the keyboards. Produced by Magnavox and Brother and Panasonic, companies that had never made it in the PC market, these machines seemed to be where daisywheel technology had gone to die.

I stood beside an interesting-looking machine, an Amstrad 9512 that looked a lot like a PC except that the monitor case was fused to the computer housing. The descriptive card beside the system read "CPM/Plus operating system, 512KB, LocoScript 2 Word Processing Software, LocoSpell 78,000-word spelling checker, Locomotive Software's Mallard Basic, Digital Research's DR Logo." I stood. And I stood. And I wondered about Locomotive Software and Mallard Basic for quite some time. Finally a salesperson approached.

He proved to be unique among the breed: not only was he there, a salesperson in a computer department, but he knew something about computers. He told me that CP/M is an older operating system that some people prefer and that it is now used mainly for dedicated word processors, such as this one.

"Would this one run Lotus 1-2-3?" I asked.

"No," he said, "for that you would need a computer that runs the DOS operating system. Have you looked at IBM clones?"

"What's a clone?" I asked.

"Like Leading Edge, isn't that a clone?"

He's asking me? Finally he gave me directions to a Leading Edge dealer nearby. Why didn't his Home Office & COMPUTER STORE sell any DOS computers, I asked.

"We used to sell them," he told me. "We used to sell everything. But the computer department has really gone downhill."

Macy's motherstore in Manhattan still sells IBMs. The phone book in Atlanta says that the Macy's in that Southern city's premier shopping center, the Lenox Square mall, sells IBM PCs. But a foray through the TVs and telephones and walkman stereos turned up only another thicket of personal word processors and a salesman who said, "Apple IIc. All we've got is an Apple IIc."

"No PCs that would run Lotus 1-2-3?" I asked.

"Not a one. Haven't had an IBM in here in a couple of years. I don't have any idea why it says that in the phone book. You don't want a IIc."

I hung around for a few minutes playing with the personal word processors while he demonstrated walkman headphones to people. Then I left.

Bits, Bytes, and Boutiques

There must be an inverse relationship between a salesperson's age and his interest in PCs. The Macy's clerk in New York was in his early twenties; his counterpart in Atlanta was 50-ish. Around the corner from Macy's in Lenox Square is the Electronics Boutique. Here two young gentlemen—age totaling about 32 years, 2 weeks—watched over tables loaded with bargain-priced software.

It was cheap and there was a reason. It was stuff you never heard of. It was stuff you never want to hear of. I debated investing ten bucks in a pair of Sherlock Holmes games until I realized that one was for the IBM and the other was for the Apple IIe.

There were a couple of demonstration machines bolted to a table beside the entrance. One was the Amstrad 1512. I asked the young gentlemen whether they sold that particular model. They said they didn't, but aimed me at Software, Etc., an emporium where they thought I might find it for sale.

"But you probably don't want it," said one of the kids. "It's not very expandable. Go to Software, Etc. You'll get a better deal there." Software, Etc. turned out to be a computer discount operation that both kids thought well of. They discoursed for several minutes on what the place offered and how much I might save. They knew computers.

Discount Doldrums

In a Service Merchandise in Somerville a week later, I came across a Commodore Colt. At last, a true department store DOS machine from one of the oldest

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David DeJean is a senior editor of PC/Computing.

makers of personal computers. It sat—completely unmarked, not even a price tag—on a display of computer furniture. I approached the elderly lady at the Cameras and Electronics counter.

"What can you tell me about the Commodore computer back there?" I asked.

"Is there a computer back there?" she said.

In such company a good salesperson stands out like an eagle in a chicken coop. The best I came across was a young man in a Lechmere in Atlanta. He knew a little about computers and he knew a little about salesmanship. He asked enough questions about why I thought I needed a computer to draw out my cover: "I use Lotus 1-2-3 at work on a . . . is there such a thing as an IBM XT? Anyway, I want to get a PC so I can take work home occasionally."

He pointed out that while 1-2-3 will run in 512KB of RAM, it's happier with 640KB, and he gently steered me away from the Amstrad 1512 (at $899), around an Epson Apex (at about $1,000), and toward a Packard Bell ($1,099) with 640KB of memory.

Even he had his limits. As we paused at the Apex to look at the PFS:First Choice integrated software package that is bundled with the machine, I asked whether the spreadsheet module in First Choice could read in Lotus worksheets. (It can't.) He had no idea, and the phrase *file compatibility* wasn't in his vocabulary.

But his heart was in the right place. "You know," he said wistfully, "I've never understood why, when a salesman sits down at a PC, it's his manager's job to get him up and moving. Doesn't it seem like we should know something about these things?"

Whether it's the manager's fault or the salesman's, the result is a chicken-and-egg problem: Because the level of knowledge among salespeople is generally low, prospective buyers of department store PCs get few answers to their questions and little support on their misgivings, so sales are lost; because sales aren't high, department stores don't put many resources in the computer department.

The maker of one department store PC has tackled this problem head-on, so to speak. The Vendex HeadStart comes tucked inside a cocoon of marketing and educational materials that are intended to make you a competent computer user without any outside help.

"But It Works . . ."

Software, Etc. in Lenox Square sold only one computer model, the HeadStart (not the Amstrad). Its main stock-in-trade is an impressive array of books, plus software and some lightweight hardware like mice and multifunction cards. A pleasant salesperson with some knowledge of PCs answered my HeadStart questions—mostly in the negative.

"Who makes it?" I asked.

"That's a really good question. I don't know anything about them. But it works real good. I've used it extensively—we've got one in our office here for our accounts and special orders and things. We've got a hard card and programs like SideKick and it works really well."

If the human didn't know much, the display surrounding the machine itself appeared quite knowledgeable. Surrounding the computer was a cardboard cutout—a nearly life-sized photograph of a bullet-headed heavyweight wrestler named King Kong Bundy, posed so that he appeared to be leaning on the computer and bragging that he got a HeadStart and learned to use it in just 23 minutes. (Vendex's extensive advertising campaign sounds the same theme.) The cutout added some solid information about the machine as well, and a pocket on the display was full of brochures that stressed how easy the machine is to set up, how much software comes with it, how expandable it is. It also summarized the support available from Vendex: an extendable warranty, on-site service, even a setup service for computer-phobes. "For those who are paranoid about even turning on the 'ON' switch," reads the cutout, "for $49.95 we'll have a computer professional go to your home or office."

"I've never understood why, when a salesman sits down at a PC, it's his manager's job to get him up and moving. Doesn't it seem like we should know about these things?"

The support continues after the sale in the form of three volumes of manuals and instructions obviously designed to serve as a primary resource for a novice user. They include lots of practical information on things like installing the chips that would expand the machine's memory to 640KB. The software includes a menu program, a tutorial, and application programs.

The other department store PCs we reviewed bundle in software as well, except for the Blue Chip, which had no bundled software. Like the hardware, the software is 1983 state of the art: For the Epson Apex it's PFS:First *Choice, a usable* but limited package that neatly integrates word processing,

telecommunications, a filer, and a spreadsheet. The Amstrad 1512's software bundle shows the computer's European background—Digital Research's GEM graphical interface, along with a paint program and a set of desktop utilities.

Toaster, Blender

If the software doesn't seem very interesting, the marketing decisions that it reflects are fascinating. Department store PCs are an attempt to create a mass-market computer, a PC that can be sold just like any other small home appliance. It's a matter of delicate balances: the price has to be as low as possible, but the machine has to be powerful enough to do real work. At the same time, the computer can't be so powerful and sophisticated that a store is forced to hire experts to sell it or give buyers lessons in how to use it.

And while most of the work done on computers is office work, these PCs will be going into the home, so they are a careful compromise of office features—they all come with enough memory to run the popular office applications and 84-key AT-style keyboards with the function keys on the left (the lessons of the PC*jr* haven't been forgotten). But they also come in small-footprint cases, with color monitors and game ports, and two of the four even come with mice. The mice aren't good really for much without software to support them, but they do lend the PCs a little bit of the "I'm-easy-to-use" Macintosh mystique.

With so many trade-offs it's amazing that the machines are as good as they are. The keyboards (except for the Amstrad one) are almost fit to touch-type on. The CGA video is OK for games, but not quite good enough for serious word processing. Anyone who has used a PC with a hard disk will feel the dual-floppy machines are almost as slow as watching paint dry. The Vendex and the Amstrad automatically create RAMdisks to help speed things up, but learning what a RAMdisk is and how to use it doesn't come naturally to a novice.

So, the bottom line: Can department stores sell PCs like toasters? Not yet. But it's not their fault, unless you cling to the antiquated notion that department stores should hire enough help to actually provide service to each and every customer. But that's a separate issue.

The problem is that PCs still aren't easy enough. You still need a kind of expertise to run a PC that you don't need to run a toaster. PCs still raise questions—questions like those in a note I found under the "Home Office & COMPUTER STORE" sign at Macy's.

The single sheet of typing paper, fresh from a daisy-wheel, bore the cryptic heading "kfjkghueghurw." At the bottom of the page, an unknown shopper had left a silent cry for help:

"some how i like this thing. But it makes too much noise. I really need a sales person. are there any advantages to this machine over the others? I have so many questions, but;there is not a sole to help me did I make a grammar error? My question is, where are all the salespersons? Ah, they are at lunch."

Amstrad 1512

The Amstrad 1512, with its liberal use of plastic and its extremely low parts count, obviously owes much of its design inspiration to the people who gave us the $4 hair dryer. That's OK for hair dryers, but it makes for a decidedly eccentric personal computer.

Take the Amstrad's plastic case, for instance. All PCs generate radio-frequency signals and need metal cases as shielding to keep these emissions in check. So how does the Amstrad get its shielding? It wraps the motherboard and floppy drives in bright, cheap tin and tucks them out of sight in the injection-molded plastic housing.

Corners like these seem to be cut in every direction with the Amstrad. The wonder is that they didn't seem to compromise the system's performance. Its processor, disk drive, and display functions are as fast as any of the other department store PCs we tested. Yet it is obviously cheap in other ways.

The quality of its video display is not as good as those of the other department store PCs. Color-chart comparisons revealed colors that bled into each other, "ghosting" of foreground characters against some backgrounds, flat color, and lack of crispness.

Its keyboard was difficult, lightweight, and lacking a solid, responsive feel for touch-typing. It also suffered from badly placed keys—particularly the Del and Return keys, which were not where a right pinkie would expect to find them.

The machine is surprisingly small and empty inside. The two floppy drives (noticeably noisy units that bear an Amstrad house brand) sit side by side in the front, and the tiny motherboard wrapped in tin sits low in the back. That's it. The graphics adapter and disk controller are not on separate cards—they're built into the motherboard. There's no fan because there's no power supply—that's in the monitor.

The system's configuration is standard for department store PCs: two 360KB floppy drives, 512KB of RAM expandable to 640KB, an 8086 processor running at 8MHz, a CGA color monitor, and serial and parallel ports. The source of the 1512's BIOS system software, a crucial component of PC compatibility, is a mystery, but it does come with Microsoft's MS-DOS 3.2, the one essential name-brand component of any PC.

Amstrad 1512

List Price: $949.99
($1,099 with color monitor).

Amstrad, Inc.
1915 Westridge Dr.
Irving, Tex. 75038
214-518-0668

It is a complete system that goes beyond the basics to add some extras—a joystick port built into the keyboard housing, a battery-backed system clock, a mouse, and mouse driver software compatible with the Microsoft Mouse.

The machine's three full-sized PC slots are extremely easy to get to—just lift the monitor out of its specially molded depression on top of the computer and open up a plastic lid. There are no screws, no need to remove the case.

The 1512 comes with Digital Research's GEM graphical interface, GEM Paint, GEM Desktop, a collection of utilities, and a version of BASIC that runs under GEM. None of these makes the computer immediately useful for business applications like word processing or spreadsheets. Rather, they convey an impression of the 1512 as an education machine, a computer for kids and games.

One interesting sidelight: the 1512's system software automatically creates a 64KB RAMdisk in memory when the machine is started up. It's a feature that in some situations can make the machine seem to work a good deal faster. But in other situations the RAMdisk can gobble a big chunk of a scarce resource in a 512KB system. It needs to be managed intelligently.

Epson Apex

When it comes to performance, a department store PC is a department store PC. They are all configured so similarly to meet their price point that there's hardly a nickel's worth of difference in the way they work or how fast.

With their 8088 or 8086 processors running at 8MHz, the four machines reviewed here are all roughly half again as fast as a standard IBM PC (which ran at 4.77MHz) and just about half as fast as an AT, with its more powerful 80286 processor.

The differences among the machines come in the small things—the software that's bundled with them, the quality of their components, and their fit and finish. And it's in these details that the Epson Apex makes its mark.

The Apex is the conservative, traditional member of the department store PC set. Whether for good or ill, it observes many of the time-honored traditions of PC design—it hides the on/off switch on the back of its conventional metal case, for instance, instead of putting it out front like the Vendex and Blue Chip machines.

Like the other department store machines, the Apex has a small case designed to fit on your desk at home, and small as it is, it is still surprisingly empty inside—two Panasonic floppy drives and a Delta 80-watt power supply on the right, four card slots on the left. Two slots are filled, one with an Epson-made graphics adapter, the other with the motherboard for the computer, a PC-on-a-card with lots of surface-mount technology on view, and a socket for an 8087 math chip.

There are a couple of noticeable omissions. While a parallel port is built into the graphics card, no serial port comes standard—odd, given that more and more people are hooking up modems to their PCs. Also, the Apex is the only one of the four machines that doesn't have a battery-backed clock/calendar on board—a minor nuisance that can become major when files must be sorted by their creation dates.

The rest of the machine's configuration is standard: two very quiet Panasonic 360KB floppies, 512KB of RAM expandable to 640KB, and a CGA color monitor. The BIOS software is Epson proprietary; the operating system is Microsoft MS-DOS 3.2. Although the power switch isn't on the front of the machine, two other switches are conveniently lo-

PHOTOGRAPHS BY STEVEN GREENBERG

Epson Apex

List Price: $1,029.99
($1,299.98 with color monitor).

Epson America, Inc.
2780 Lomita Blvd.
Torrance, Calif. 90505
800-922-8911

cated there—a reset button and a switch that toggles the 8088 CPU between 4.77MHz and 8MHz.

The monitor and keyboard on the Apex were the best of the bunch. The monitor displays vivid colors and sharp images without any smearing and is as readable as any CGA device can be, considering CGA's relatively low screen resolution. The 84-key AT-style keyboard is up to Epson's unusually high standard—with its solid touch and good layout, it is a pleasure to use, better than keyboards that are included with far more expensive computers from other manufacturers.

In operation the Apex seems almost austere beside the razzle-dazzle of mice and color menus and RAMdisks on some of the other machines. But the PFS:First Choice integrated software that comes bundled with the Apex makes a quiet impression. It provides word processing, database, spreadsheet, and telecommunications functions in an easy-to-navigate package that positions it nicely to fill the needs of a modest home office.

Vendex HeadStart

The Vendex HeadStart is the department store PC of choice for the adult beginner. It is designed to be easy to use. The power switch is right up front on the machine, not hidden at the back. Its extensive software package includes a menu and a tutorial on how to use DOS, in addition to the more normal word processor, database, and spreadsheet. And it comes with a set of manuals that are obviously intended to serve as a primary resource and confidence-builder for the novice user.

The software applications aren't anything from the Hall of Fame. They aren't even particularly good. But they're there in the box, and Vendex has used clever packaging and preparation to weave them into a system that is not intimidating and can be used immediately by people who know little about computers. Startup files automatically install the menuing program, called HOT, so the user isn't left all alone with the DOS prompt. The application disks are color-coded, which makes it that much easier to get the right one into the machine when HOT asks for it. A set of color-coded labels is even provided for the software backups the user is encouraged to make.

Vendex HeadStart

List Price: $995
($1,295 with color monitor).

Vendex Technologies, Inc.
40 Cutter Mill Rd.
Great Neck, N.Y. 11021
516-773-3062

While the software is anonymous (the spreadsheet, for instance, is a program called My Calc), the hardware is anything but. There are more familiar brand names on view inside the HeadStart than any of the other machines—like a power supply from Samsung (a robust 135 watts) and two Panasonic floppy drives. And this includes the system software as well—Phoe-

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WAIT STATE	ZERO	ZERO	ZERO	1
SYSTEM MEMORY	1024K to 16MB	1024K to 16MB	640K to 16MB	640K to 16MB
CACHE MEMORY SIZE	64KB	64KB	32KB	–
KBD. SELECTABLE SPEEDS	YES	YES	YES	YES
COPROCESSOR SUPPORT	80287/387	80387	80287	80287
32-BIT SLOTS	–	1	–	–
16-BIT SLOTS	6	4	6	6
8 BIT SLOTS	2	1	2	2
SERIAL PORTS	2	2	2	2
PARALLEL PORT	1	1	1	1
HARD DISK/FD. CTLR.	YES	YES	YES	YES
1.2MB 5¼" OR 1.44MB 3.5" FD.	YES	YES	YES	YES
ROM BASED SETUP/DIAGNOSTICS	YES	YES	YES	YES
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nix BIOS, Microsoft's MS-DOS 3.2, and GW-BASIC—which bodes well for the machine's compatibility with a wide variety of software. The major peripherals, the monitor and keyboard, aren't famous names, but they perform well. The CGA monitor provides vivid colors and crisp character display. The keyboard is decent—not as solid as the Apex, with a shorter travel to the keys, but it has a solid feel and is very easy to touch-type on.

Physically the HeadStart is a small, almost empty box. The design manages to get small by using an interesting trick: the computer has no motherboard. Its electronics are built into two add-in cards, one for the 8088 CPU and related circuitry, and the other a multifunction card with monitor and mouse connectors and room for memory expansion.

For such a small computer it is surprisingly roomy inside. The HeadStart has no fewer than seven slots for add-in cards, four of them open. Only the two-card PC-on-a-card set is in the slots. Take out the two game port connectors, which occupy a back-panel opening but not an expansion slot, and you have five open slots.

The machine's configuration is standard: two 360KB floppy drives, an 8088 processor that can be switched between 4.77MHz and 8MHz, a CGA color

What About Warranties and Tech Support?

Like refrigerators, trash compactors, and the computer you use at work, department store PCs come with warranties. And like those other machines, they occasionally need service.

If you've considered purchasing a computer that shares store space with air conditioners, but you've doubted the quality of the tech support you'd receive, think again. We found the warranties on department store PCs to be respectable and the support no less friendly, helpful, or occasionally frustrating than for any other appliance.

Blue Chip offers a money-back guarantee that its pcPopular is IBM PC compatible and gives a one-year warranty on the machine itself. You can go to one of 135 third-party service centers across the country if you need hardware service.

Amstrad has contracted with 540 service centers nationwide to honor its one-year warranty on the 1512.

Vendex offers an array of extended warranties, including on-site service, to its standard one-year coverage of the HeadStart. The warranty is honored at 350 third-party service centers nationwide. You can extend the warranty on the software that comes bundled with the computer. Hardware and software support is unlimited and free.

Reaching a helpful tech support person can be a challenge, whether your computer wears capital letters or the brand name of a department store PC.

Amstrad's tech support line is toll-free, but when its people are busy (and that was 10 out of the 11 times we called), a recording directs Touch-Tone dialers through a series of menus that call up recorded technical information. A tape plays. It finishes. The phone disconnects. Call from a rotary phone, and you're simply told to call back later.

From the recordings, I culled all kinds of information about my PC 1512—but, unfortunately, a live human voice was more elusive. Amstrad also offers a 24-hour bulletin board for technical information. This electronic communication can be quite helpful, especially for avoiding the maze of recorded messages.

With the Epson Apex comes a one-year warranty serviced by the company's 100 Customer Care Centers as well as third-party companies. There's a toll-free number for repair referrals only. Tech support is on your nickel.

I called the toll-free line, reported a bad disk drive, and was given two phone numbers of establishments near me. The first number reached an outfit that didn't work on the Apex. The other had been disconnected. I called Epson back to get more phone numbers. The operator asked for the zip codes of cities surrounding mine—without them he couldn't look up the other service centers.

Vendex offers a toll-free hardware support line. There a tech support person answered the phone promptly, was unusually friendly (even asked my name), and spoke with genuine interest in my problem. What's more, he explained what I needed to do in clear layman's terms.

I called Blue Chip's toll-free support line with a problem common enough to someone who has just bought a computer to use at home. The machine couldn't read a file I had created at the office.

My service person quickly realized that I was trying to read a file from a high-density disk in a low-density drive. In about three minutes he explained how to transfer the file to a double-density diskette.

Plugging in a refrigerator isn't as complex as transferring a file to the proper diskette, of course. But as PCs proliferate, consumers demand the same fast, knowledgeable service that they receive for simpler machines. Fortunately, manufacturers of department store PCs seem to be responding to that demand.

—*Marty Jerome*

Marty Jerome is an associate editor of PC/Computing.

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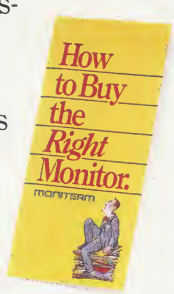

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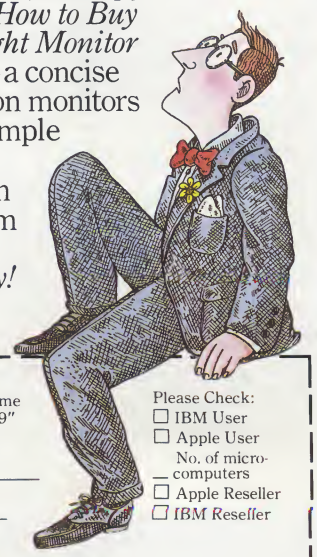

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monitor, and serial, parallel, and joystick ports. It departs from the basics by providing for a bit more memory expansion than usual—it comes with 512KB of RAM that's expandable to 768KB—and it includes a clock/calendar on the multifunction card.

The HeadStart is so much like the old IBM PC that it even preserves some of that machine's bad habits. It takes what feels like forever to do a cold boot: it runs a complete RAM check, then installs a 112KB RAMdisk, then the HOT menu system, and finally it turns control over to the user. The HeadStart, like the Amstrad 1512, sets up a RAMdisk to improve system performance a bit. The startup routine creates a 112K RAMdisk and copies Command.com into it.

Blue Chip pcPopular

If department store PCs are bought to take home for the kids to play games on, then the Amstrad 1512 is probably the prototypical department store PC. If they are bought to bring modest computer power to a home office, to do light-duty word processing and some spreadsheet financial work, then either the Epson Apex or the Vendex HeadStart gets the nod because of their bundled software.

But if department store PCs are bought to provide an occasional computing platform for work brought home from the office, then the Blue Chip pcPopular takes the honors. It's inexpensive. It's simple. It is, in fact, the plainest PC of a very plain bunch.

The pcPopular lacks every possible frill—no clock/calendar, no mouse, no bundled software. It's strictly back-to-basics—two 360KB disk drives, 512KB of RAM, CGA color monitor, serial, parallel, and joystick ports on the back of the machine, a BIOS from Award Software, and MS-DOS 3.2, which should make it compatible with most of the software that could follow a businessperson home. The only distinguishing feature is a welcome one: an on/off switch on the front of the machine.

For kids' play or for working at home, these PCs can fill the bill.

The case is very small—made possible by yet another variation on the mothercard trick. In the pcPopular, the motherboard is divided into two add-in cards, one for the 8088 CPU (there's also a socket for an 8087 math coprocessor) and the other a multifunction card that holds output ports, system RAM, and the disk controller. The graphics adapter takes a third slot, so that only one is left for future developments. A separate short slot with no access to the outside is available for a hard-disk controller card.

The pcPopular's components are pretty anonymous. The floppy drives say "Newtronic"—not exactly a household name—and no manufacturer's name appears on the graphics adapter card or the power supply. The machines are manufactured by a Korean firm, Tri-Gem, for the Blue Chip marketing organization. Tri-Gem won the order last year after a rift between Blue Chip and its former supplier, Hyundai.

Blue Chip pcPopular

List Price: $949.99
($1,349.98 with color monitor).

Blue Chip Electronics, Inc.
7305 W. Boston St.
Chandler, Ariz. 85226
602-961-1485

The machine is solidly built, and its design makes clever use of the available space inside the case. The add-in cards, for instance, install horizontally rather than vertically; if you put the cards in the right order, the sockets for the RAM expansion to 640KB on the multifunction card are accessible simply by removing the machine's cover.

The pcPopular is the only one of the four department store machines that will accommodate a hard disk drive as well as two floppies. A 3½-inch 20MB hard drive can fit behind the two stacked floppies in a space carved out of the power supply housing for that purpose.

The pcPopular's video display is not as good as those of the Vendex and Epson machines in color-chart comparisons, but in actual use its white text on black background is quite acceptable for tasks like word processing.

The keyboard is marginal—light of weight, cheap of feel, but usable for touch-typing. ◧

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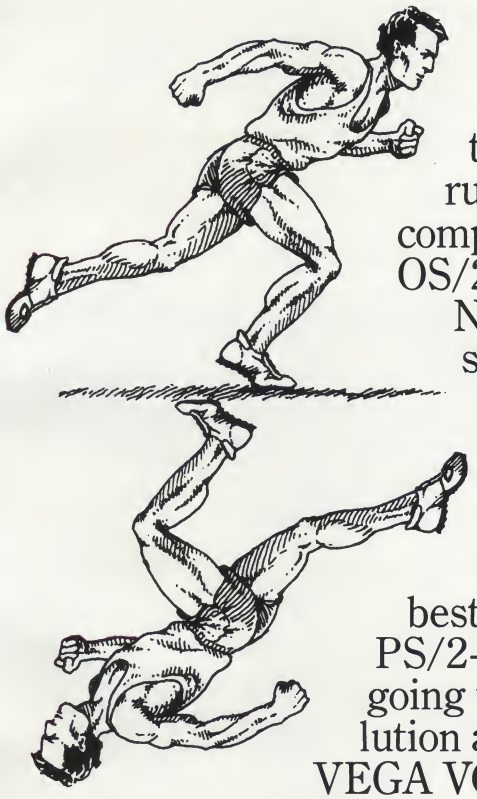

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Dialing for Data

No matter how much you think you know, there's an online database that knows more.

By FREDRIC PAUL

These days, you can look up just about anything without touching a book or budging from your chair. Online databases from thousands of vendors, accessible through hundreds of online services, let PC-equipped researchers delve into almost any subject. No matter what your field, there's probably a database that can tell you more about it.

Lawyers can check statutes and case law from all 50 states using services such as Lexis and WestLaw. Chemists can use Questel's DARC system to search for chemical structures, then cross-reference the information with patent databases. Orbit supplies bibliographic citations on hundreds of technical topics. Investors can get financial information and price quotes from a number of services, including industry giant Dialog, Dow Jones News/Retrieval, and specialized investment services such as Warners and PC Quote. For interested amateurs, services such as CompuServe, The Source, GEnie, and Delphi offer an easy way to explore the growing online universe.

With all that information at your fingertips, log-

ILLUSTRATIONS BY JOHN ALFRED DORN III

ging onto an online service can give you a heady sense of omniscience. But it can also induce anxiety. Most database services charge by the minute, and the sheer volume of available information can overwhelm novices. Indeed, an online search can resemble a frantic quest to find your car in a huge parking lot in the dark, while spending $150 an hour for the privilege.

The profusion of competing databases and access providers, the Boolean logic used to describe search functions, and the need to cope with complex and nonstandard user interfaces while paying high and often unpredictable fees combine to scare off many potential customers. As a result, much of today's online research is still being done by librarians and other professionals.

Just as PCs brought computing to the masses, online services are now appealing to average users.

But database providers are doing their best to make it easier for newcomers to navigate through the online world. Like the computer industry, the online information industry was born to serve specially trained experts. Yet just as PCs brought computing to the masses, online database services are now appealing to average users as well.

The trend toward people doing their own online searches has "happened more gradually than the industry would have predicted three to four years ago," when the idea first surfaced, says Peter Bonner, director of marketing at BRS Information Technologies. Many people, he says, just didn't see why they needed so much information in the first place.

Today, Bonner says, increasing computer literacy among the scientific, technical, and research communities, as well as a more widespread knowledge of what online database services can provide, are bringing more people into the fold.

Brad Schepp, associate editor of the *Datapro Directory of On-line Services,* adds that cutbacks among corporate librarians are making it necessary for end users to get involved. Rather than wait for a research request to bubble up to the top of a busy librarian's in-box, businesspeople are doing it themselves.

Another important contributing factor is the growth of full-text databases. When online databases first appeared in the 1970s, they contained primarily bibliographic and directory material. A search might tell a user where to find information on a particular topic, perhaps providing abstracts of magazine or journal articles, but researchers still had to turn to printed source material to obtain the data. Few businesspeople had time for that.

Full-text databases put entire articles online. Researchers can read them directly on the screen or download them to their PCs for later perusal. Full-text databases have become the hottest part of the online industry.

Beefing up full-text offerings is only part of the effort to attract more end users to online research. Other approaches include menu-driven interfaces to guide novices to the right database, front-end software programs that reside on the user's PC and help simplify search commands (see accompanying reviews), and gateways that link together several database services. The more advanced gateways create a common command language and translate search commands to a form each database can understand. On a more prosaic level, online companies have worked up plenty of aids to make their systems easier to use, including help screens, minimanuals, and newsletters.

Where to Begin

The first step in conducting a online search is to pick the right database for the job—not always a simple task unless you use online services a great deal, says professional researcher Judith Sovner-Ribbler, president of Searchline Associates, Inc., in Brookline, Massachusetts. There's no one "right" database or online service for every question. One database might be best suited for gathering data on management and strategic planning, while another might concentrate on product information. "The right database is the one that answers your question," says Sovner-Ribbler.

Menu-driven systems and special features can help track down a suitable database. Many online services now feature a menu of all databases on the system, often grouped by subject heading. And many include global search functions that check into whole groups of databases at once. This may add a surcharge to the search, but it increases the likelihood of getting a "hit."

Sophisticated front-end gateway services, such as Telebase Systems' EasyNet, serve as online clearinghouses, offering access to a wide range of databases. EasyNet is a gateway to nearly 850 databases from leading services such as Dialog and BRS. It includes a special menu function to help you choose the right database and a scan utility that gives you a quick peek into several of them to see what turns up. Telebase remarkets EasyNet through Western Union (which sells it as InfoMaster), CompuServe (which calls it IQuest), and a number of other vendors.

Once you reach a database, the next step is to phrase a search question in a way that the database

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Fredric Paul is a senior editor of PC/Computing.

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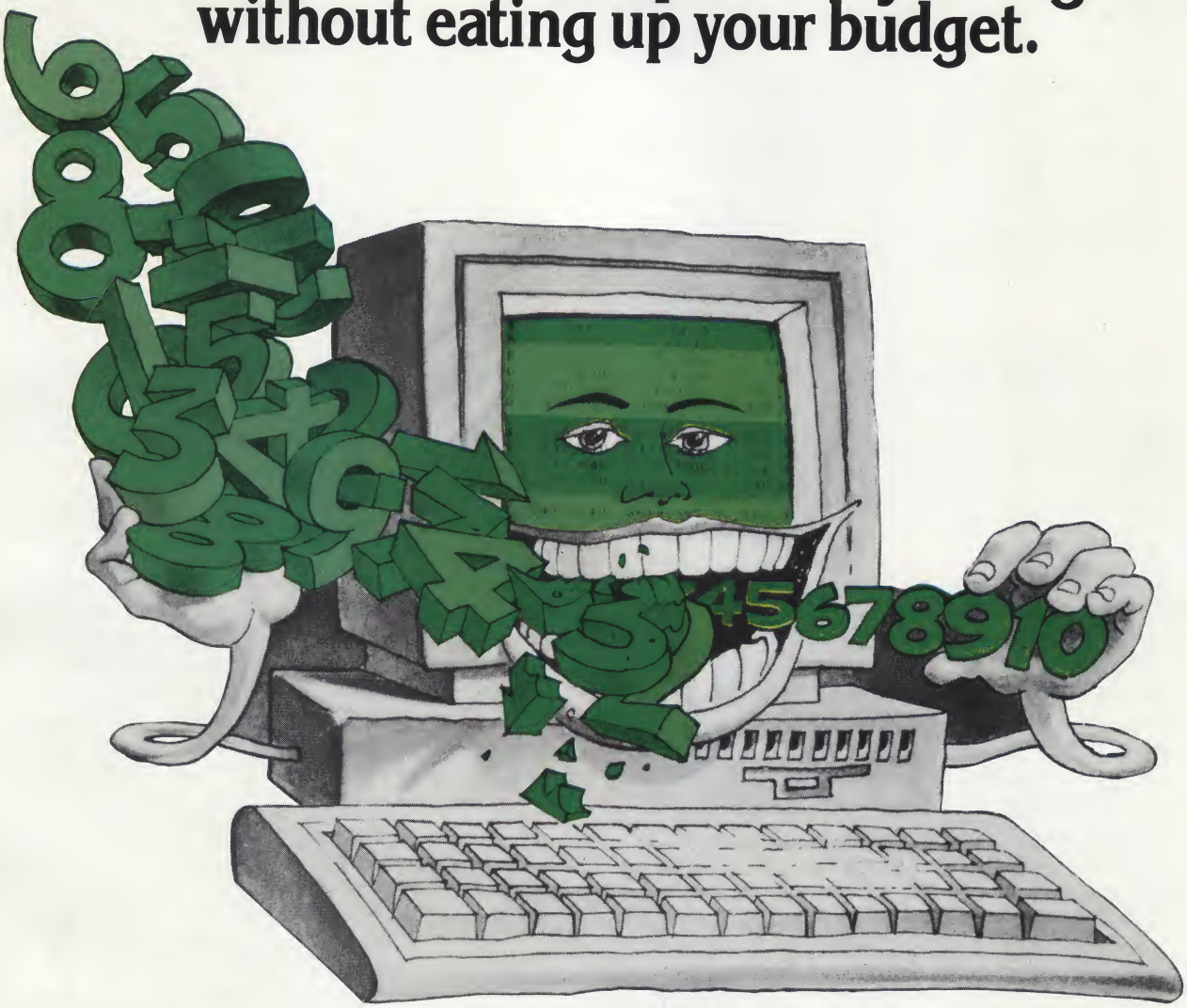

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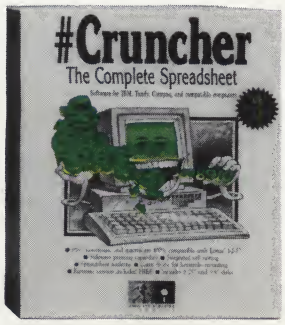

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will understand. Most databases use a proprietary version of Boolean logic, with specialized meanings for such words as *and, or,* and *not.*

And you may have to get used to the search process more than once. In the world of online databases, there is no such thing as a standard interface. Some use English terms such as *and* and *or* in their command languages, while others employ hard-to-remember symbols like .. and /. The commands used to move around in the database also differ, as do the search capabilities. WestLaw, for example, lets you search for two terms in the same sentence or paragraph, while Lexis lets you specify how many words can separate the desired terms. Some systems tell you how many times your search terms turn up in a document.

So, although all search systems do approximately the same thing, learning one will no more help you with another than knowing WordStar will help you use WordPerfect. Here, too, the online industry is doing its best to remedy the situation. EasyNet, for example, offers a standard interface for all the databases it accesses.

What's on the Menu?

Dow Jones News/Retrieval is another online service that pays a lot of attention to its user interface. The service—whose offerings include the full text of *The*

Tips for Going Online: A Baker's Dozen

Learning to use online databases may not be a piece of cake, but the results can be pretty tasty. These sweet tips from online professionals should help you get the information you need while keeping costs *in* line.

1. Don't be intimidated. There's no mystique to searching online databases; it's all a matter of perseverance. The more you use one, the easier it gets. Like learning to drive a car, searching a database may be an awesome task at first, but eventually it becomes automatic.

2. Take a course. Many database services offer training sessions on their systems. The money you save by doing faster, more effective searches will more than pay for the course fee. Alternatively, spend time with an information broker or librarian. Pay for an informal training course if you have to.

3. Online bulletin board and communications services, such as The Source or CompuServe, can be good references for learning more about database searching. Use them to ask other searchers for help.

4. Be prepared. Decide what you are looking for and set up your questions in advance, not while you are online. Have backup plans ready in case your initial search yields too much or too little.

Searching a database is like going grocery shopping. If you make a list before you start, you save money and come home with what you want. And never go shopping hungry—you'll end up with a cart full of ice cream and Twinkies. The same holds true for online databases. Make an outline of the information you're looking for, and remember: you're being charged by the minute. If you forget, your first bill will be a firm reminder.

5. Understand the logic of the Boolean operators that most systems use to construct queries. Used in a Boolean sense, words such as *and, or,* and *not* may mean something different from what you'd expect. For example, an instruction to search for words x *and* y will not pull up all references to either of the two words, but only instances where both appear in a document together.

6. Remember that every database is unique, and different search techniques work best with different databases.

7. When searching full-text databases, consider restricting your search to headlines and first paragraphs. Searching the full text may pull up documents that merely mention your search terms but are not really pertinent.

8. If possible, make global searches of all databases that may be of interest. Don't port your search from database to database if you can do it all at once.

9. Every database is priced differently. If cost is an important consideration, try the less expensive databases first, and use the discounted after-hours services such as BRS After Dark and Dialog's Knowledge Index. Both Dialog and BRS allow you to query prices as you search.

10. If the database you are interested in comes in a CD-ROM version, you may be able to use it at a local library. And even if you need more up-to-date information or don't have reliable access to the disc version, you can hone your searching techniques on the CD-ROM system for use online.

11. Download the documents you want and read them later to cut online time. Save them to disk instead of printing them directly.

12. Once you establish a pattern of use on a database service, see if you can program your software to perform that function automatically to save time and money.

13. Finally, if your research needs are varied or infrequent, it may make sense to pay a professional to do your searching for you. It's a lot like fixing up your house. You can pinch pennies by doing it yourself, but that can end up costing a lot of money if your lack of experience leads to mistakes. On the other hand, if you plan to pursue a lot of online research, it's worth your while to become an expert. —*FP*

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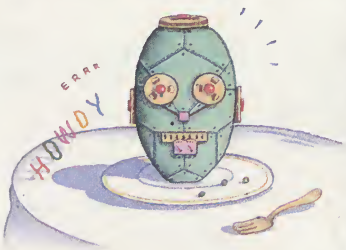
Wall Street Journal and a host of other business publications, as well as a number of online financial services—is available via a gateway from MCI Mail, so a lot of novices dial in. According to company spokeswoman Carla Gaffney, "Our aim is to make it as easy as possible [to use the system], so corporate executives will do it themselves." It already provides a menu-driven path to move between databases, and the company is working on a new front-end interface to bring more menus to the search process.



As part of a long-term effort, Dow Jones spent $5 million last year on a pair of Connection Machine supercomputers from the Thinking Machines Corporation. The company hopes to use these parallel processing computers to develop artificial intelligence techniques that will let users pose their search questions in plain English, without having to deal with strict Boolean logic. The first results of the company's efforts should surface by late this year or early next year.

Dialog, the largest and best-known online database provider with more than 300 databases on a wide variety of topics, has a reputation for being difficult to use. But even Dialog has introduced menu-driven options for several of its services, including the Business Connection and the Medical Connection. Many of Dialog's individual databases, such as Tax Notes Today, McGraw-Hill News Service, and the Census Data File of census information, also use menu-driven interfaces. Ran Hock, manager of the New England region for Dialog, says more are coming.

Figuring out how to use a new database takes time, and when you're online, time is money.

But Hock is not a complete convert—he believes that users pay a price for the convenience of menus. He says that a menu-driven system just can't provide the full flexibility and retrieval control that a command-driven interface can.

Donna Willmann, director of marketing for competitor VU/Text, agrees. She contends that a trained searcher using commands can get better results faster than a novice using EasyNet menus.

And Richard K. tenEyck, president of On Point, Inc., in Wellesley, Massachusetts, points out that with what he calls EasyNet's "black box" approach, you never know if the system is giving you exactly what you asked for. The black box may not understand all the subtleties of a sophisticated search. For example, says tenEyck, who is also the Boston Computer Society's director of telecommunications, a banker looking for information on "trusts" might get back citations for articles on the state of modern relationships. And because EasyNet jumps in and out of databases to save money on connect time, amending a search often means starting over from scratch.

Where's the Money?

Figuring out how to use a new database takes time, and when you're online, time is money. Standard access charges can run into hundreds of dollars an hour, depending on the service and the database. Although many services provide free access time as part of a startup package, it's often not enough.

"One major problem is the learning curve, which you pay for," observes Bea Donovan, a private investor in Annapolis, Maryland. Donovan had used CompuServe to access financial information, but quit because of the cost. Even after learning to use the system, "I found it was not cost effective for me because I wasn't in a major city," she says. "In addition to the access charge, I had to pay for a long-distance call" to reach the access number. Today she gets stock quotes from a free, advertising-supported audiotex system sponsored by *The Baltimore Sun*.

Many users complain that online costs are not only high but unpredictable. Every database has its own rates, and many calculate their fees using arcane formulas including monthly subscription fees, connect time, number of documents retrieved or downloaded, telecommunications charges, and other factors. Even worse, most services don't tell you how much you're spending as you go along.

EasyNet addresses the problem by charging for successful searches instead of for connect time. The price varies with the individual resellers and may include surcharges for certain databases, but you don't pay unless the search "hits." The fee includes only the first group of hits; if you want more, there is an additional charge. Of course, the prices include a profit margin, but at least the costs are relatively consistent. And it does have an onscreen reminder of how much you've spent.

Online database connect charges are expected to remain high, even as more and more people access them. Creating a database is labor intensive and therefore costly. Database companies are learning to cut costs by entering data offshore (often in Taiwan, the Philippines, and the Caribbean), using automatic scanners, and by capturing the information online at its source. But instead of lowering prices, the companies are using the savings to build bigger, better databases, and to help fuel the boom in full-text services.

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Some observers hope that competition from desktop databases using CD-ROM technology will begin to put some price pressure on online services. CD-ROM holds the potential to put a huge quantity of data on a user's desk, and the first CD-ROM databases are now hitting the market. Since it sits on the desk, users buy the database instead of paying to access it, making CD-ROM appropriate for high-volume research situations. But a CD-ROM system is expensive, the databases are not cheap, and CD-ROM can't match the variety and timeliness of information online. Executives at online companies now tend to speak of CD-ROM as a complement, not as a competitor. In fact, many of the leading online services, including Dialog, BRS, and WestLaw, already market some of their data in CD-ROM form.

Getting Better All the Time

Of course, online companies are also taking less revolutionary steps to make it easier to use their services. Online help screens are becoming much more common and more sophis- *(continued on page 208)*

Navigator: CompuServe's Autopilot for the Mac

Considering that Navigator, a telecommunications program that runs on the Macintosh, is sold by CompuServe, you might expect it to be a simple pictures-and-icons program designed to get beginners to sign on and sample CompuServe's games, electronic mail, news, and what-have-you.

But the package is a powerful tool for automating diverse and sometimes difficult tasks while using CompuServe, the largest online service in North America, which has 450,000 members in 97 countries.

Navigator is an impressive piece of work: it can run in the background under MultiFinder, so you can use other programs while large messages are coming or going; it can be set to work late at night when rates are low; and it is easier to program and reprogram than the Pascal-like scripting languages in most sophisticated telecommunications programs.

This program is more than a set of training wheels—it's an autopilot. Desktop Express does the same thing for MCI Mail but deals only with electronic mail, not with the abundance of special discussions and information available from a service such as CompuServe.

Before signing onto CompuServe, you set up Navigator by clicking on dialog boxes and typing in key words for subjects and messages you want searched. Then you set it loose to sign on automatically, do the search, sign off, and report back to you on stock prices, comments about Apple programs, messages about scuba diving in Hawaii, and whatever else you've asked for. Files will be moved to or from your computer using CompuServe's own B protocol; graphics files are just as fair game as text and programs. The pull-down menus control the order in which Navigator calls the various forums and whether it sends or receives messages and files during a particular session. You may add new forums to those on the Navigator lists, which don't cover everything in CompuServe.

You can watch Navigator as it works or come back later and see a saved record of the session. You can interrupt a session and send messages manually, and there's a terminal mode for calling CompuServe without the automation. One piece of advice you should heed before using the program: try CompuServe the old-fashioned way first, so that you know which forums you want to keep track of.

The manual is a good reference to the various dialog boxes, but it doesn't contain a tutorial; I couldn't get Navigator to work until I called technical support at CompuServe. Even after that I had problems: my Mac froze once and had to be restarted (I was using the suspect System 6.0 software from Apple).

Navigator Version 2.1, which I tested, has several features that its predecessors lack. If you're artistically inclined, it allows you to draw a very simple face that will be displayed when someone reads your message with Navigator. It also includes a Quick Quote and Market Snapshot feature for fast stock market information and a search menu that is useful for finding a forum buried in an imposing stack of dialog boxes.

Despite these advancements, the program could use some more powerful key word commands—such as Boolean (*and, or*) logic—for practical searching. And I have a problem with the idea of clogging up my hard disk with different communications programs for every database or electronic mail service I use. Still, the price is good, and I'm excited about getting more out of CompuServe. Navigator didn't help me find my way, but it quickly got me where I wanted to go, and without my direct attention.

—*Phillip Robinson*

Phillip Robinson, an engineer, writes for several computer magazines and edits Desktop Engineering News.

CompuServe Navigator Version 2.1

List Price: $79.95; $59.95 if downloaded from CompuServe.

Requires: Macintosh with 512KB RAM, double-sided 800KB disk drive, System 3.0 or later, Hayes-compatible modem.

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Read It And Reap.

TO: Any one interested in writing improvement

FROM: Ken Dickens, ad writer

RE: Writing improvement with NEW Grammatik III, a demo disk, and a contest to get both ABSOLUTELY FREE

"Software to easily help me write more better (not just easier or faster, but "better")?" "Right, Don." That's what I said last year when the president of Reference Software bet a gourmet lunch that Grammatik II could help even me. I lost. He ate quail eggs. I ate crow.

Now there is Grammatik III. Don says "it's a super whiz-bang high-tech expert system artificial intelligence writing improvement program that makes Grammatik II (and all other grammar checkers) look like Dick and Jane readers. He wants to bet lunch again.

What should I do?

He says Grammatik III actually "proofreads" your writing (how can it do that?) for errors in grammar, style, usage, and spelling. It can recognizes nouns, verbs, adverbs, articles, adjectives, and pronouns so it catches a number of problems no other grammar or spelling checker can. It's simple too use. Give Grammatik III your document's name. Watch it work, right on the screen (it can't be that easy, can it?). He says it identifies writing problems, offers suggestions for improvement, and get this, lets you ignore the suggestion and continue, or make changes in your document immediately. Without ever going back to to your word processor.

Then he gave me this example, (which I don't believe even for a minute): Grammatik III might stop on a sentence like "Its a long way to Tipperary", tell you that the word following "its" is usually incorrect after an possessive pronoun, and suggests "It's" instead.

POSSESSIVE ERROR, ONLY 18 TO GO, GOOD LUCK

I laughed. I knew it was impossible. Don smiled and very calmly explained that although Grammatik III is not perfect, it finds errors like incomplete sentences, improper use of homonyms (like "their" instead of "there"), split infinitives, subject/verb and noun/modifier disagreements, passive voice, and etc. It even catches unbalanced punctuation, doubled words, transpositions (like form/from). . . . He went on for fifteen minutes.

Software can't do that. Can it? But if it did. . . better writing brings big bucks (and I do have three kids to support). Should I take the bet? I'm confused. Help! Before I try it, tell me if Grammatik III helps your writing. Enter this contest (the details are below), try Grammatik III free, and let's discuss it over dinner. In San Francisco.

Ken Dickens

The Contest Everyone Wins.

New Grammatik III found nineteen practical ways to improve this memo in just over one minute. If you can circle the same problems and explain what the problems are, we'll send you Grammatik III absolutely free. Go ahead, try it. Because even if you miss them all you'll receive a FREE Grammatik III demo disk just for entering. And, you'll automatically be entered in our "Dinner in San Francisco" drawing.†

The contest is great, but here's an even faster, easier way to get better writing. Order Grammatik III right now for only $99 with our "30-Day Write Better or Your Money-Back Guarantee." New Grammatik III. It's *the* risk-free way to reap the rewards of better writing.

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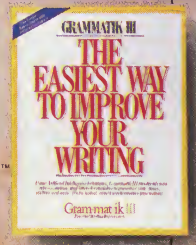

FREE DEMO!

☐ *Here's my contest entry. Please send me a FREE Grammatik III demo disk ($4.95 value).*
☐ *Please send me _____ copies of Grammatik III for $99ea. plus $7.50 shipping ($10 per unit outside USA) CA residents add applicable sales tax.*

I enclose $ _____ ☐ VISA ☐ MC ☐ AMEX
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Name _____
Company _____
Address _____
City/State/Zip _____
Phone ( ) _____
330 Townsend St. Suite 123, San Francisco, CA 94107

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**RightWriter owners call for special $29 trade-up offer or get a FREE copy of Grammatik III if RightWriter finds all the mistakes in the above letter. Grammatik II owners call for low-cost upgrade. †Limit one (1) free Grammatik III package and Grammatik III demo disk per person/address. San Francisco trip is for two (2) and includes round trip airfare from anywhere in the continental U.S., one night's hotel accommodations, and dinner with Don Emery and Ken Dickens. Travel arrangements will be made by Reference Software. Contest ends March 15, 1989. Drawing to be held from all entries postmarked before March 15, 1989. Contest entries using Grammatik III will be disqualified. Grammatik is a trademark of Wang Laboratories. Reference Software is a trademark of Reference Software, Inc.* *© 1988*

CIRCLE NO. 251 ON READER SERVICE CARD.

Pro-Search: Neophytes Can Search like Pros

It won't make you an expert overnight, but Pro-Search, from Personal Bibliographic Software, can make online database searches on BRS and Dialog far less intimidating if you're an inexperienced database user. It does this by leading you through the query process offline, thereby sparing you considerable time and frustration when you do get online.

This new online database assistant also shelters you from having to learn the complex commands required to navigate the murky waters of most databases. You can use a language akin to English: Pro-Search translates your request into a form understood by the databases.

You start out by choosing from four general categories—Arts and Social Science, Biology and Medicine, Business, and Engineering and Science. Then you choose a specific subject, such as agriculture, books, or computers. A series of windows that look like index cards appears, summarizing which databases have the information requested.

From here, you enter search terms and select the Retrieve command to start an online search. Pro-Search handles the details of logging on and issuing commands to select the database, search for information, and retrieve references.

The software makes it easy for occasional or new users to construct a search. It will accept either BRS or Dialog search arguments, regardless of which system is being searched. Even better, Pro-Search lets you use English-language queries rather than the complex terminology normally required by databases. For example, when you ask Pro-Search to do a search of "software for the PC," it translates the request to "software(2w)PC" and sends it to Dialog.

Once a search is completed, Pro-Search displays the number of "hits" it finds. The documents can then be viewed alone or with their related abstracts.

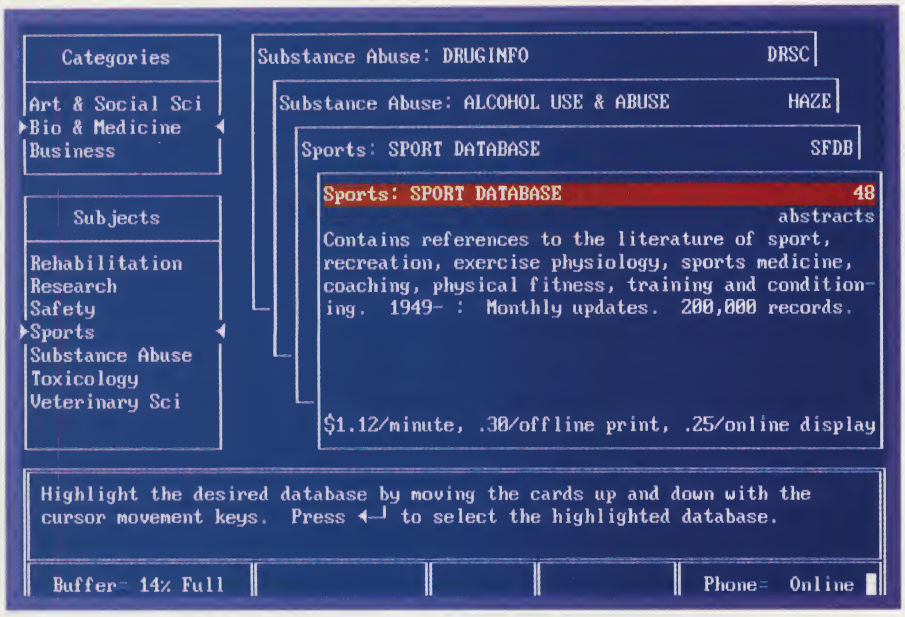
The software makes it easy to edit and combine search strategies. And once you get comfortable with a service, you can use the database's "native" mode to enter search arguments directly.

Pro-Search also contains a fairly sophisticated cost-accounting function for monitoring online costs. For professional researchers, the program has facilities for establishing client accounts and printing invoices.

Perhaps the best feature of Pro-Search is its user interface. Its moving-bar menus make most operations quick and intuitive. Although the lack of an installation routine could be confusing to some, Pro-Search is not an intimidating program to use.

In fact, the only problems with Pro-Search are its lack of support for certain online functions, such as Dialog's TrademarkScan, and its high cost. The basic package is nearly $500, and you'll want to add $150 a year for quarterly updates. Category disks and various add-ons can quickly send the price much higher. However, if you value your time, Pro-Search could be the bargain you've been looking for.

—Doug van Kirk



Pro-Search uses index-card-like screens to show BRS or Dialog database summaries. In this example, Pro-Search is online to Dialog's Sport Database. The subject selected is Sports, the category Biology and Medicine.

Doug van Kirk is an associate editor of PC/Computing.

Pro-Search Version 1.07

List Price: $495; quarterly update service, $150/year; updated category disk, $50.

Requires: 320KB RAM, two disk drives (hard disk recommended), DOS 2.0 or later, modem, BRS or Dialog information service subscription.

Personal Bibliographic Software, Inc.
412 Longshore Dr.
Ann Arbor, Mich. 48105
313-996-1580

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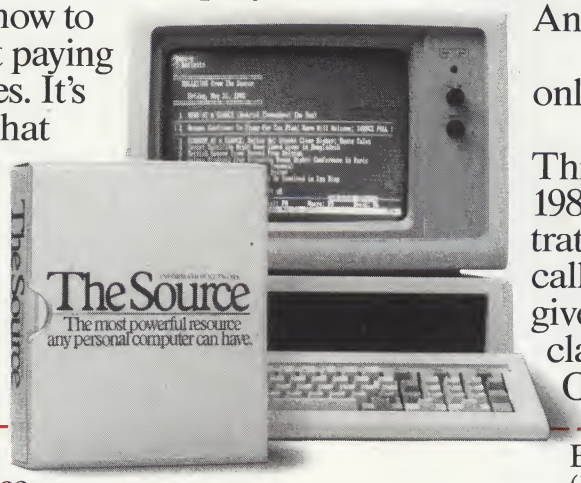

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CIRCLE NO. 159 ON READER SERVICE CARD.

ticated. Several systems have practice databases that allow users to test the database for a fraction of the cost of accessing the full set of records.

In a low-tech vein, many online services now send newsletters or magazines to subscribers. These free publications contain information about new databases and features and often promote special deals.

Even more encouraging, the hefty—and mostly unread—manuals that once dominated the industry have been replaced in many cases by less intimidating minimanuals.

Things are clearly getting better for people who don't do research for a living but still want access to information. More information is online than ever before, and database services are finally making it easy for nonprofessional researchers to get at the data they need.

Attempts to unify the online industry may meet with scorn. After all, similar attempts haven't worked in the PC world.

But in the same way that many people complain that PCs are still too hard to use, few are convinced that we've reached the pinnacle of easy access to online databases.

The Boston Computer Society's tenEyck says that database producers need to come up with something to bridge the gap between black boxes, which may compromise the integrity of a search, and complex command structures that make it impossible for novices to get anything done. Down the road, he expects improved artificial intelligence techniques and neural networks to let database computers think more like human beings.

One long-term solution might be to create a standard interface to access online databases. In some ways, EasyNet attempts to do just that, but other vendors seem skeptical. One competitor sneers that EasyNet "does it with mirrors." That same reaction might be expected to greet any effort to unify the industry; after all, such attempts certainly haven't worked in the PC industry.

No matter how much information goes online, and no matter how convenient access becomes, not everyone will want to use online services for everything. As VU/Text's Willmann explains, "even if you made it the easiest system in the world," top executives would still delegate research to someone else. "Even if they know how," Willmann says, "they don't have the time." And at least one professional online searcher is willing to admit, "I still look in the newspaper for movie schedules." ◧

Leading Online Database Services

BRS

BRS Information Technologies
1200 Route 7
Latham, N.Y. 12110
800-468-0908; 518-783-1161

Formed in 1976 as Bibliographic Retrieval Service, BRS now offers international access to 150 databases in all areas of science and technology, medicine, business, literature, education, and the social sciences. Menu-driven option available. BRS After Dark is a bargain-priced subset of the service's most popular databases and is available in off-hours. BRS Colleague is a version of the main database tailored for medical professionals. A CD-ROM product is also available. Now owned by TBG, Inc.

BRS Search Service: Connect time, $12–$25/hr. Individual databases charge $8–$102/hr. plus document charges. User manual, $45. BRS After Dark: Registration fee, $75. Connect time for databases begins at $8/hr. plus document charges. Monthly minimum, $12. User manual, $15. BRS Colleague: Registration fee, $95 for individuals, $175 for groups. Connect time varies per database, $20–$112/hr. Monthly minimum, $20–$50. Volume discounts available. Reference manual, $55. Database available on CD-ROM for $1,650.

CompuServe

CompuServe, Inc.
5000 Arlington Centre Blvd.
P.O. Box 20212
Columbus, Ohio 43220
800-848-8199; 614-457-0802

The largest online information service, with more than 450,000 subscribers. Although primarily used for real-time communications, CompuServe's Information Service offers access to 400 financial, travel, business, education, shopping, and news databases. IQuest is a private-label version of EasyNet. Owned by H&R Block.

Connect time, $6–$12.50/hr. Communications surcharge, $0.30–$12/hr., depending on access mode. Some databases carry additional surcharges.

Delphi

General Videotex Corp.
3 Blackstone St.
Cambridge, Mass. 02139
800-544-4005; 617-491-3393

An online information service concentrating on real-time services such as electronic mail and special interest groups. Also, access to Dialog, stock quotes, news, weather forecasts, travel information, encyclopedias, and Boston city information. Easy to use.

Membership, $49.95. Connect time, $6.60–$17.40/hr. No monthly minimum, no premium for high access rates. Discount plans available. Database access may carry additional charges. Manual, $19.95.

Dialcom

Dialcom, Inc.
6120 Executive Blvd.
Rockville, Md. 20852
800-435-7342; 301-881-9020

An electronic mail service with more than 280,000 user mailboxes. Also offers access to databases covering business, general, and political news; travel; and medical information. Gateways to BRS and Dow Jones News/Retrieval. Owned by British Telecom.

Connect time for basic messaging services is $14/hr. Each 1,000 characters of input and output cost 5 cents. Communications charges, $1–$7/hr. domestic, depending on network used. Commercial clients are subject to a $500 monthly minimum and a $100 account fee that covers field support. Premiums apply to other services.

Dialog

Dialog Information Service, Inc.
3460 Hillview Ave.
Palo Alto, Calif. 94304
800-3-DIALOG

The prototypical online database service. More than 300 databases and news services used by 86,000 subscribers in 86 countries. Many full-text services included. In business since 1972. Although not particularly easy to learn, some experts say that for the amount of effort it takes, Dialog still returns the most value. The Knowledge Index after-hours service—with more than 60 popular databases—is often cited as an online bargain. Publishes CD-ROM versions of several Dialog databases as OnDisc. Recently purchased by Knight-Ridder.

Annual service fee, $25. Connect time prices vary by database, $35–$300/hr. Typical search takes 5–10 minutes and costs $10–$20. Volume discount plans available. Also, charge for each document downloaded, $0.10–$100. Some Dialog databases carry a charge for outputting records, typically $0.50–$2. User manual, $60. Knowledge Index startup fee, $35/hr. Connect time, $24/hr.

Dow Jones News/Retrieval

Dow Jones & Co., Inc.
Information Services Group
P.O. Box 300
Princeton, N.J. 08543-0300
609-452-1511
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PC Computing

(continued from page 208)
and financial news and information, including exclusive access to the full text of *The Wall Street Journal* and current news from the Dow Jones News Service. Also provides access to travel databases, college selection services, and movie and book reviews. Menu-driven options available. Available through MCI Mail.

Startup fee, $29.95 for individuals (5 free hrs.), $49.95 for businesses (8 free hrs.). Annual service fee after first year, $12. Connect time charges, $0.10–$3.25/min. Discount plans available.

EasyNet
Telebase Systems, Inc.
763 W. Lancaster Ave.
Bryn Mawr, Pa. 19010
215-526-2800

Gateway switch and common menu-driven interface to 850 databases. Distributed through more than a dozen private-label remarketers, the largest being Western Union, which calls the service InfoMaster. Others include CompuServe's IQuest and Learning Link's Einstein.

Connect time, $0.15/min. Main pricing is per successful search, but each distributor prices the system individually. EasyNet charges $10 per search, which includes 10 headings for a reference or abstract database, 15 headings plus one full-text article for a full-text database. Surcharges may apply to particular databases. InfoMaster charges $8–$33 per search.

GEnie
GE Information Services
401 N. Washington St.
Rockville, Md. 20850
800-638-9636

Primarily an online consumer information service for PC users, à la CompuServe or The Source. Also offers gateways to travel databases, news and reference databases, stock quotes, and data on Microsoft software products. Like most consumer services, GEnie is menu driven. More than 110,000 subscribers.

Registration fee, $29.95. No monthly minimum. Connect time, $35/hr. peak, $5–$10/hr. off-peak, at 300 or 1,200 bps. $7.50/hr. surcharge for 2,400 bps.

Lexis/Nexis
Mead Data Central, Inc.
9393 Springboro Pike
P.O. Box 933
Dayton, Ohio 45401
800-227-4908

Lexis offers over 3 million cases, statutes, and legal documents in the U.S., France, and Great Britain. Nexis provides access to full-text versions of more than 350 magazines, newspapers, newsletters, and wire services, including *The New York Times* and *The Financial Times*. Nexis also contains financial information from annual reports, research studies, and other sources, as well as medical, scientific, and technical information.

Lexis: Monthly charges begin at $125. Connect time, $20/hr. Telecommunications charge, $8–$12/hr. Searches, $5–$30 each. Installation, training, and other charges also apply. Volume discounts available. Nexis: Monthly charges begin at $50. No training charge. Otherwise same as Lexis.

NewsNet
NewsNet, Inc.
945 Haverford Rd.
Bryn Mawr, Pa. 19010
800-345-1301; 215-527-8030

Offers more than 350 business newsletters in 35 industries as well as access to national and international wire service reports and the TRW Business Profiles. Hybrid command-menu operation.

Annual subscription fee, $120. Connect time, $60/hr. at up to 1,200 bps, $90/hr. at 2,400 bps. Multiple account and introductory discounts available. Individual databases may carry surcharges.

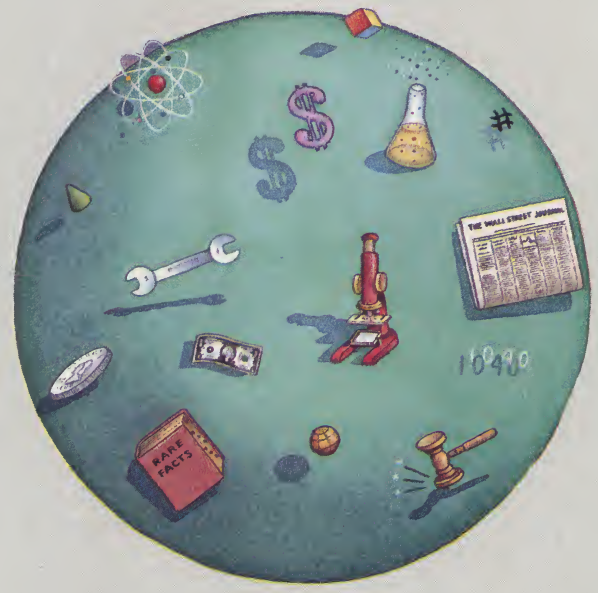
Orbit Search Service
Pergamon Orbit InfoLine, Inc.
8000 Westpark Dr.
McLean, Va. 22102
800-45-ORBIT; 703-442-0900

Orbit offers access to 75 million records in more than 60 bibliographic and numeric databases on scientific and technical topics, especially patents, chemistry, energy, and engineering and electronics. Does not use menus and is not particularly friendly to first-time users. Can be accessed though EasyNet, however.

Connect time costs vary with the database and start at about $35/hr. Prepayment and annual commitment discounts are available. Telecommunications costs, $12/hr. Printing and downloading charges vary with the database.

Questel
Questel, Inc.
5201 Leesburg Pike, Suite 603
Falls Church, Va. 22041
800-424-9600; 703-845-1133

Approximately 45 databases for pharmaceutical and chemical manufacturers, including patent and trademark information. DARC system searches databases for chemical structures. Also provides access to international trademark databases. Mostly used by professional researchers. PC software packages allow searchers to phrase queries offline and upload them.



Connect time charges, $30–$172/hr. Display and print charges, up to $10 per document, with most under $1. Annual service fee, $15 per password. Telecommunications charge, $12/hr. Other charges for special services. User manual, $45.

The Source
The Source Telecomputing Corp.
1616 Anderson Rd.
McLean, Va. 22101
800-336-3366

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One-time registration fee, $29.95, includes toll-free telephone and online support, unlimited use of free tutorial, user guides, complimentary subscription to *SourceWorld* newsletter. Connect time charges, $0.10–$0.46 for most standard services.

VU/Text
VU/Text Information Services, Inc.
325 Chestnut St., Suite 1300
Philadelphia, Pa. 19106
800-323-2940; 215-574-4400

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WestLaw
West Publishing Co.
50 W. Kellogg Blvd.
P.O. Box 64526
St. Paul, Minn. 55164-0526
800-WESTLAW; 612-228-2450

A legal database including the U.S. Code, federal regulations, and state case law and statutes; specialized topical libraries on tax, securities, labor, bankruptcy, and insurance; Shepard's citations; law review articles; and *Black's Law Dictionary*. Citations and abstracts, as well as some full-text material. Gateways to Dialog, Dow Jones News/Retrieval Service, PHINet, VU/Text, and Information America. Competes with Mead's Lexis for the legal market. Developing a complementary CD-ROM product. Stresses advantage of West Publishing's editorial staff. Relatively easy to use, but no menus.

Subscription charge, $125/month. Database charges, $145/hr. for first 3 hrs., less afterward. Connect time charge, $20/hr. Communications charge, $10/hr.; $20/hr. surcharge for access at greater than 1,200 bps. Small office price plan with no subscription charge, 20 min. monthly minimum: Flat database charge, $4/min. Connect time charge, $0.34/min. Communications charge, $0.17/min.

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The 286/14 is also powered by an Intel 80286 CPU, but operates at 14 MHz (with zero wait states) for even faster performance. It, too, comes equipped with 1024KB memory, 1.2MB floppy disk drive, serial/parallel/game ports and a 101-key keyboard. No doubt about it — it's a hot machine and a dream to fly!

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The 386/20. It's made for those who want to fly to the outer limits. With an Intel 80386 microprocessor operating at 20 MHz (with zero wait states) it'll move through the most complex applications with astounding ease. And you won't have to worry about running low on memory either. It not only features 1024KB of RAM and a 1.2MB floppy disk drive, it also has a 64KB cache memory. Naturally, it comes equipped with serial/parallel/game ports and a 101-key keyboard, too.

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ILLUSTRATION BY CARY HENRIE

High Anxiety

Viruses, pranks, crime—everyone tells scary stories of PC security. Whom, and what, can you trust?

By HERB BRODY

THE PC PARANOIA merchants are having a banner year. These consultants and vendors are spreading alarming stories of lost and stolen data, disk-destroying viruses, and industrial espionage. Their mission: alert the PC community that PCs are dangerously leaky links in the information pipeline. The situation is critical, they say, because desktop machines have become the repository for information that once was kept in the well-guarded shrine of the data processing department.

It's beginning to sound as if PC users will have to abandon their laid-back ways and start laboring under many of the restrictions that have long characterized mainframe computing, such as passwords and user IDs, encrypted files, and limitations on physical access to the computer. The change is bound to rankle. "People start using PCs for the freedom," says Thomas Davenport, director of research at Index Group, a management consulting firm in Cambridge, Massachusetts. "PC security is an oxymoron."

Davenport may exaggerate, but he does have a point. The greatest charm of the personal computer, after all, lies in how accessible it makes vast quantities of information: just turn on the machine and you can call up text, numbers, diagrams, and everything else stored in it. In principle, at least, it's a snap for unauthorized eyes to feast on your files.

And if the computer is hooked into a local area network, a snooper can peek at even more information that's meant to be kept secret.

The consequences can be catastrophic. A pilfered mailing list or product formula could cost a business its competitive edge. Robert Niebuhr of 3M recalls that secret product information was once stolen from the company's computer files. The thief tried to sell it. But the intended customer—a 3M competitor—reported the incident to 3M, which prosecuted the case. The offender, whose methods were never discovered, wound up in jail.

Experts have virtually no idea how widespread computer crime is in general, or how much involves PCs in particular. "All reported numbers are invalid," says Donn Parker, an information security consultant at SRI International. Sensational anecdotes lend credibility to the sales pitches of PC security companies. But no one knows whether the handful of publicized incidents constitutes the tip of the iceberg or the iceberg itself.

Statistics are scarce because the victims are staying quiet. Reports of security violations erode the confidence of a company's public and investors. This concern is especially acute for financial institutions. "Banks are resistant to sharing information with law enforcement officials," says police detective John Michalec, who investigates white-collar crime in the affluent Pittsburgh suburb of Mount Lebanon, Pennsylvania. "Consumer confidence would go down the drain if word of a security breach got out."

Traditionally, victims have had little incentive to prosecute. "Our common-law heritage undervalues information," says Buck BloomBecker, director of the National Center for Computer Crime Data in Los Angeles. Until recently, stealing or damaging data was only a misdemeanor. Even more discouraging, says Michalec, was the fact that convictions were almost impossible to come by without a confession. But those days are ending. All but two states (Vermont and West Virginia) have enacted legislation that specifically outlaws computer-related crime and makes such offenses felonies.

Confirmed cases of viruses are still relatively rare. "More people are *living* off viruses than dying from them," says one computer security consultant.

Far better than punishing the offender, of course, is preventing the offense. Today's PC users have been "brought up wrong," says Jon David, a consultant based in Tappan, New York, who specializes in computer security. People began using computers to enhance their productivity; security was something for the mainframe-keepers to worry about. Having to type a password and user identification in order to work on your own machine was anathema to the whole idea of hassle-free computing.

But reported outbreaks of viruses—tiny segments of software code that spread secretly from disk to disk—are changing all that. The PC fraternity is starting to circle its wagons against the threat of viruses, which come out of hiding at a programmed date, surprising the user with pranks ranging from the cute to the destructive.

Confirmed cases of viruses are still relatively rare. So far, they have been limited almost entirely to academic environments, which are full of bright hackers with time on their hands. Data loss to these electronic pseudo-organisms has been minimal; they have caused more inconvenience than anything else. "More people are *living* off viruses than dying from them," says security consultant Robert Courtney, alluding to the booming sales of virus detectors and software "vaccines." Courtney is former director of data security at IBM and now consults for IBM, Exxon, Chase, and other large corporations.

SRI's Parker likens the virus scare to the 1960s threat of LSD-tainted drinking water: possible but highly unlikely. He says vendors of antivirus products and services are exaggerating the problem. "Viruses will fade away," he predicts. "Those companies will go out of business."

You don't have to spend a lot of money to avoid viruses. The best defense is to use software only from a known, reliable source. Programs offered through bulletin boards are of uncertain origin; expose your computer to such software and you're "leading with your chin," says Albert R. Belisle, deputy director of corporate computer security at Bank of Boston.

Commercial antivirus products will not provide long-term protection. Many virus detectors examine the operating system every time you boot up and flag any change as a possible virus. That's a nuisance—legitimate changes, involving upgrades and the like, produce the same warning. More seriously, antivirus software works only against today's viruses. The devilish programmers who plant these bit-bugs will no doubt conjure up new ways to sneak past these defenses. "Wherever there are programmers, they're going to play," says John Wilkinson-Heap, a senior consultant at Arthur D. Little specializing in computer security.

The uproar over viruses has led computer security companies to introduce products they admit offer little value. "The whole thing is a boondoggle," says Ralph Ferrara, president of Security Microsystems. The company offers no standard antivirus product, but on special request it will supply a program that checks the Command.com file for changes. Software Directions includes a virus detector in its SoftSafe program, which controls access to hard disks. But

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Herb Brody is a senior editor of PC/Computing.

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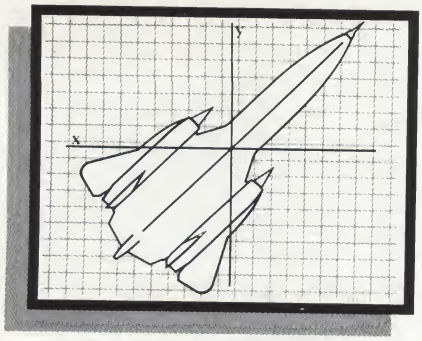

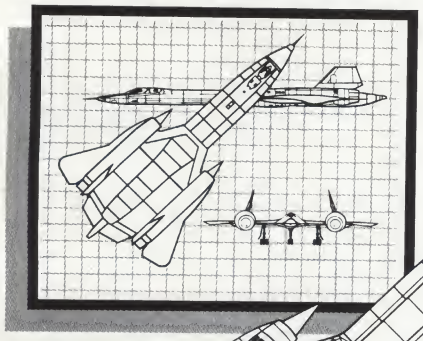

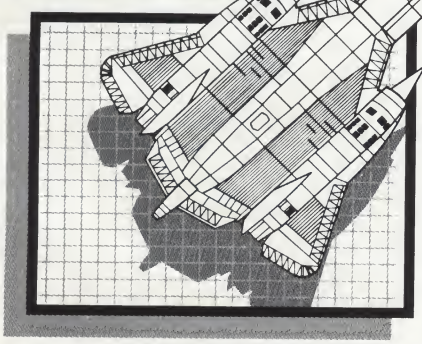

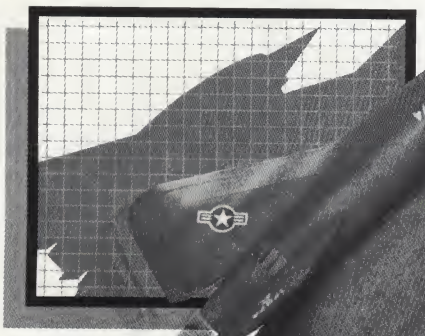

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company president Geoffrey Wiener admits to throwing in the feature mostly as a sales gimmick; security products these days have to at least look as if they're doing something to stop this scourge.

As security concerns mount, the control of PCs is increasingly becoming the domain of data processing managers—the folks who have made careers out of limiting access to big computers. At many companies, the time has already passed when you could walk up to your desk in the morning, flip on your PC, and go to work. Corporate security officers, mindful of what seems to be a rash of computer crime, have instituted restrictive policies that threaten to roll back the computers-to-the-people revolution.

This trend is perhaps best exemplified by recent interest in a new class of desktop machines that cannot store data locally. These diskless PCs pack the computational power of an ordinary PC, but without a hard disk or floppy drive, they cannot serve the ends of anyone trying to pilfer data (see sidebar).

A mini-industry providing PC security has sprouted as companies hope to profit from business's paranoia. At least a dozen companies sell products that purport to keep PC data out of harm's way. Security consultants, mostly from the mainframe world, peddle advice on guarding your PC and its contents. Several products restrict access to desktop PCs.

Simple gadgets have modest goals, such as permanently affixing the computer to the table or putting a locking cover over the power switch. More sophisticated products use software to make your PC think it's a mainframe that will bare its soul only to those who type in the right secret code.

But rising anxiety is pulling more sophisticated

Safety Precautions

We all know that computer security is important, but we normally don't do much about it. It tends to be something we think about when we have just lost a file or the business next door has burned to the ground. The common perception is that security is exasperating, disruptive, and costly—a drag on productivity.

But it needn't be that way. PC security can be made more friendly—it's not a contradiction in terms.

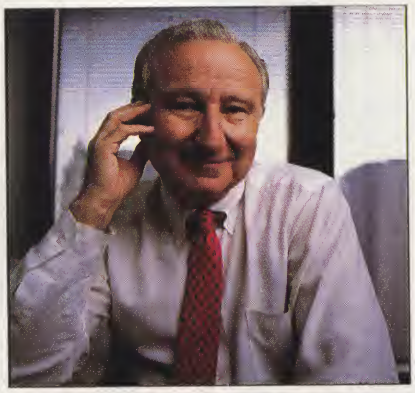
The goal is to protect information assets—data and programs—against unauthorized destruction, modification, disclosure, or use. These assets are less likely to suffer damage from the deliberate acts of spies or scoundrels than they are from the mistakes of well-intentioned people, such as you and me.

Guarding the information assets of the business is part of everyone's job. Most people are willing to observe good practices if they perceive that doing so is in their own best interest. When faced with a security chore, users quickly assess the comparative risks. How much trouble is it to do? What kind of trouble will I get into if I don't do it? What if I don't get the rest of my job done?

Commonsense security need not be bothersome; indeed, it can often save time and energy. Here are some effective security practices:

- Rename potentially harmful programs, such as Format, so that you will have to think twice before using them. Or simply remove the Fdisk or Format programs from your hard disk or DOS diskette.
- Use the Autosave feature found in many programs, before someone comes by and shuts down your PC while you are away from your desk.
- Have one person verify the information entered by another; have one person sign the check cut by another. Although intended primarily to help people avoid mistakes, such controls also deter theft.
- Process applications for new user IDs and authorizations speedily. Otherwise, users will share IDs and passwords to get their work done.
- Respond quickly to employees' requests for new PC software. If there is too much delay, they may resort to making unauthorized copies of licensed software.
- Make passwords both easy to remember and difficult to guess. Derive them from a string of words—a pass-phrase, such as "green dog runs," that creates a vivid picture in the mind. Then, using a published table, convert the phrase into passwords of various lengths. The user need remember only the pass-phrase.
- Make all security-related documents—policies, guidelines, standards—readily available to employees, either online or on disk.
- Often, more can be accomplished by example than by edict. It is a powerful statement for the CEO to lock up his or her computer and diskettes at day's end—and to admonish subordinates who don't.

—*Alan R. Krull*



Commonsense security can often save time and energy, says Krull.

PHOTOGRAPH BY DAVID WAGENAAR

Alan R. Krull is a consulting instructor at IBM's Information Systems Management Institute in Chicago. He speaks frequently on protection of information assets.

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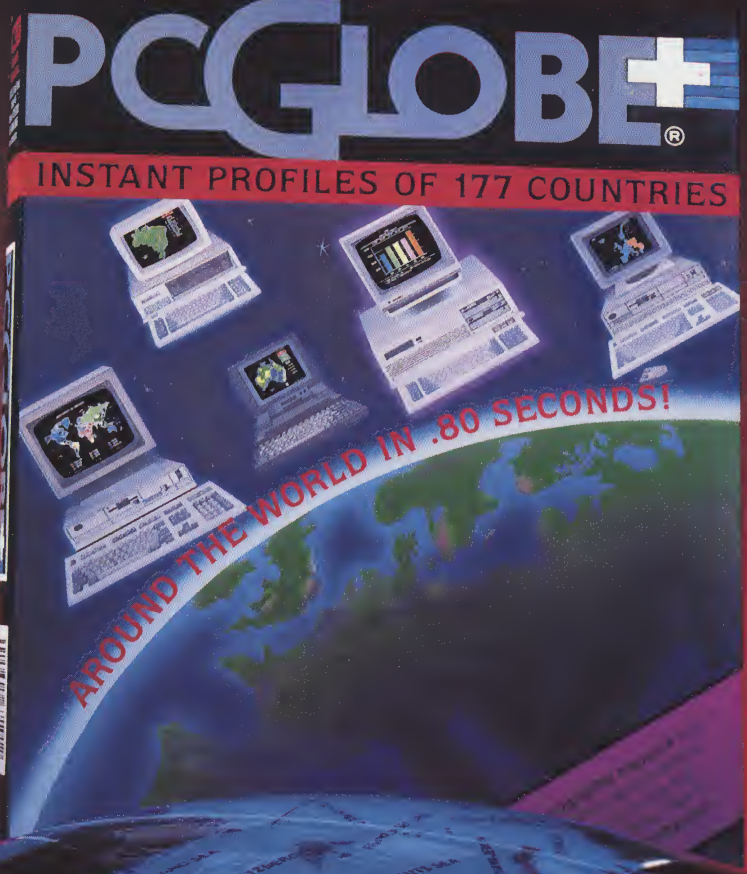

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protective measures to market. The largest category of products is probably access control software. Among such programs are Watchdog, from Fischer International Systems of Naples, Florida; Lockit, from Security Microsystems Consultants of Staten Island, New York; SoftSafe, from Software Directions of Randolph, New Jersey; and SecretDisk II, from Lattice, Inc., of Lombard, Illinois.

All these programs do roughly the same thing. After installation, the computer behaves much as a terminal to a mainframe. Boot it up and you're asked to enter a user ID, then a password. If you pass this little test of authenticity, you can proceed. But even then, you will have access to only those files deemed appropriate by some higher authority, who uses a master key to configure the system.

SoftSafe, which sells for $99, is particularly easy to set up and use. To protect sensitive information, you need only store the file in a special subdirectory. SoftSafe automatically encrypts everything placed in that subdirectory, scrambling the bits according to a complex mathematical algorithm. These files become

Security Blankets: Diskless PCs

One of the easiest ways to guard information on a computer is to remove the disk drive. Working on a diskless PC—a computer connected to a network but with no internal memory—leaves a user no way to upload information into a database or download programs or data and head out of the building with them.

Diskless PCs are cost efficient, easy to use, and compact. Because they have no moving parts, they're exceptionally quiet desktop units. Best of all, they provide a safeguard for corporate software and hardware investments and a secure way to protect data.

Companies that spend large amounts of money to upgrade their software and hardware aren't anxious to subsidize their employees' extracurricular projects. And with more personal computers installed in homes, many people are "just a few thousand dollars away from duplicating the environment they have at work," says Ernest Wassmann, product marketing director for Esprit Systems, a maker of diskless workstations in Melville, New York.

Before NCNB Texas bought 200 diskless workstations from 3Com, the commercial bank had been ordering Compaq computers with the disk drives removed. "We wanted as little data as possible stored locally," says Tim Crowell, NCNB Texas's vice president in charge of local-area-network support. The low cost of 3Com's 3Station attracted the bank initially, says Crowell, but the product's security features made it especially appealing for the network expansion Crowell had in mind. "We had to put in many of the stations at the clerical level, and we didn't want them [the workers] to have the capability to copy the software or company data and walk off with it," he says.

New federal regulations covering the banking industry will make diskless PCs even more attractive for system administrators like Crowell. While auditors have always carefully scrutinized mainframe security procedures, they'll soon be applying the same stringent checks to standalone PC systems. A network with 100 diskless PCs tied into it will eliminate the annual auditing headaches that 100 standalone systems would create.

Heavy network users such as banks and insurance companies are the main customers of diskless PCs, but the terminals are also a big hit with the U.S. government. George Gazurian, president of Consolidated Professional Systems, a consulting firm in Cherry Hill, New Jersey, specializing in mainframe-to-PC integration, counts federal agencies among his best customers. The company's recent clients include the Federal Aviation Administration. "They're setting up networks throughout the country, and they're looking to control their software," says Gazurian. "They don't want any software inserted into or extracted from the system."

The computer-virus scare has also made companies more security-conscious. Gazurian says that although he's been selling the Earthstation-Ie diskless workstation for nearly a year, he's seen a sharp rise in interest during the past six months due to the threat of viruses. "Whenever we mention security, it has more of an impact now," he says. "More than anything else, computer viruses have made organizations interested in diskless PCs."

Crowell has discovered an unexpected benefit of the added security of a diskless PC—it's helped him coax computer-wary executives into using their desktop machines. The knowledge that information can be neither uploaded nor downloaded has given many executives the confidence to take advantage of all the system's capabilities.

Market forecasters expect the diskless-PC business to explode over the next few years. Dataquest predicts shipments will leap from 25,000 in 1987 to 1 million in 1992. TeleVideo and 3Com hold the largest market shares, but the potential is attracting new entrants, including some of the computer industry's major players. Both NCR and Unisys have introduced diskless PCs, and last year IBM shipped thousands of PS/2s with the drives removed. While IBM has no official diskless product, it hints that it might jump into the market in the future. *—Deborah Asbrand*

Deborah Asbrand is an associate editor of PC/Computing.

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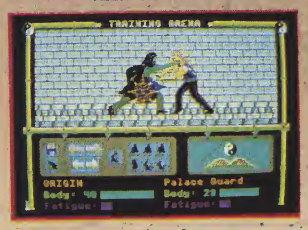

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the secret property of the user who created them; anyone logging on with a different ID and password will not even see them listed in the directory.

You can even install a biometric device called the Electronic Signature Lock that recognizes the way you type. An impostor who knows your password would still be locked out, unable to duplicate the rhythm of your keystrokes. To train the system, you type a word or phrase many times. Thereafter, access is granted only to someone entering the phrase with the same pattern of delays between keystrokes, plus or minus a tolerance you can set.

The Electronic Signature Lock, marketed by a company of the same name based in Fall Creek, Oregon, serves another function not directly related to security. If you're extremely tired, nervous, or inebriated, you won't be able to type according to your normal pattern and the device won't let you log on. It's probably best to become more alert, calm, or sober before beginning work anyway.

Such exotic safeguards may be missing the point, however. A far more significant security problem lies in a more prosaic realm: keeping the machine itself from being stolen. Computers have replaced Selectric typewriters as hot targets for office thieves. "PCs grow legs when they're near doors," says John O'Leary, managing director for educational resources at the Computer Security Institute in Northborough, Massachusetts. Usually, the object of the crime is simply to procure a computer, which can easily be fenced to a used-computer merchant. But the recent shortage of memory chips has brought fears that computers will be stolen for their parts, which conjures an image of a computer counterpart to the auto thief's "chop shop."

So far, PC thieves apparently have not been after stored data. A couple of cases have caused some jitters, however. This spring the Pentagon's Strategic Defense Initiative Organization reported the theft of two computers: one a privately owned Amiga, the other a government-owned IBM-compatible machine. A half-dozen suspects were arrested, and Software Directions spokesman Alan Freitag says there is no evidence that national security information was compromised. In another disturbing case, burglars stole a PC from the State of California that held files on about 70 AIDS victims.

One unusually thoughtful thief took a computer from a tax preparation firm in Walnut Creek, California. Upon discovering that the hard disk contained clients' tax information, the thief performed what passes in criminal circles for an honorable act: he copied the computer's stored files onto floppy disks, which he mailed back to the firm.

Preventing PC theft starts with old-fashioned, low-tech locks. The best is the familiar Anchor Pad,

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popular for typewriters and now becoming a common means of securing computers. Available from Anchor Pad of Ventura, California, the fixture bonds to a table with an extremely strong adhesive, and the computer locks into this glued-down base.

A newer arrival is the AlarmCard, from the company of the same name in Bellevue, Washington. This half-size board is equipped with mercury switches that trigger an alarm when the computer is moved. The device is armed only when the power is off, so it doesn't go off with everyday jostling.

PC theft poses such disastrous potential primarily because of the information-rich hard disks permanently installed in the machines. One way to minimize the threat of data loss is to separate the hard disk drive from the computer. The FBI, for example, recently began using outboard hard disk drives from the IVT Computer Corporation of McLean, Virginia, to store its most sensitive files. These drives can be stored safely in a vault overnight.

When securing PCs, it's important to keep the problem in perspective. Although computers present a tempting target to the corporate spy, information is much more readily available in other forms. The best way to find out what a company is doing is probably to go to the local watering hole at quitting time and strike up a conversation with employees. The insider-trading scandal involving *Business Week* magazine provides a case in point: the leaked information on hot stock tips came not from prying into a reporter's word processor but from bribing someone who worked in the printing plant.

The second-best method is to go trash-hunting; few organizations enforce policies limiting what can be thrown out intact. SRI's Parker proposes a whimsical solution to the data security problem: an integrated package in which paper flows straight from the printer into the shredder and into the trash.

In the end, security must become not so much a collection of products as an attitude. "People need to start thinking of the PC as a data center, with all the concern for confidentiality that is present with mainframe systems," says Robert Hansel, computer security manager for Fairfax County, Virginia.

Simple, nontechnological solutions go a long way toward ensuring data secrecy. Some fall in the don't-put-the-key-under-the-doormat category. Floppy disks containing confidential data can be locked up at night. Extremely sensitive information should probably be kept off a hard disk.

At the risk of belaboring the obvious, it is silly to post your password on the side of your machine. Nor is it wise to use as a password an easily guessed string of characters, such as your name. "We're not short on technology," says Robert Courtney. "The real key to PC security is to hold people accountable." ◪

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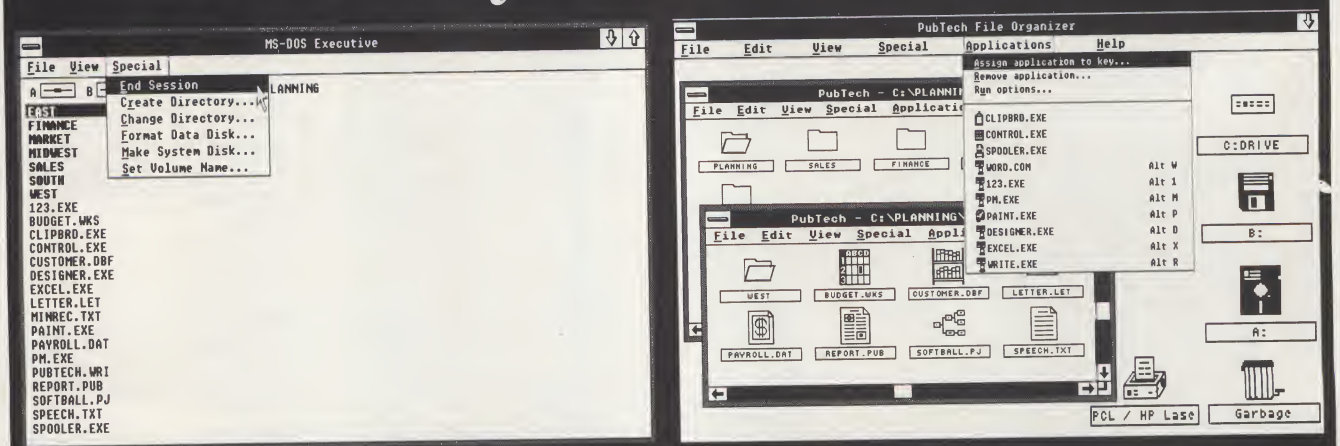

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Macro Shortcuts

Time management help for WordPerfect: the first in a series of macros for the top word processors.

By JUDY HOUSMAN

One easy way to make a word processor more productive is to get a faster and more accurate typist.

No, we aren't suggesting you call a temp agency or enroll in night school. Instead, use your word processor's macro capability to enter several paragraphs of boilerplate type or accurately reproduce a series of tricky formatting commands—all in a single keystroke combination.

Even the simplest macros increase productivity dramatically. You type one keystroke combination, and the computer translates it into a series of keystrokes. Once you have recorded a macro, the same keystroke sequence is played back each time you use it. And computers never—well, almost never—make typos.

Start looking at any repetitive set of keystrokes as a candidate for a macro, and you'll start finding countless ways to automate your word processing tasks. Typing boilerplate for such often-used paragraphs as "For further information, call our sales office at 319-889-7890," entering frequently invoked series of formatting commands such as tab and margin changes, and typing tricky sequences for changing directories are all likely prospects for automation through macros.

At their most basic level, word processing macros function like a tape recorder, watching and recording as you enter a frequently used keystroke sequence. You can play it back whenever you need it.

Today's sophisticated programs typically do that and more. They let you create macros that pause for input from the keyboard, a capability that lets you automate such things as the production of a standard company memo or boilerplate phrases such as "The lessor, known as _____, contracts with the lessee, known as _____, to rent the premises at _____." Most programs let you invoke one macro with another, and some, such as WordPerfect, include full-fledged programming languages that can branch to perform different tasks at your request and wait for a specific amount of time before performing the action, or store variables such as a client name for use throughout the macro.

When evaluating a program's macro capability, look for the ability to edit the macro from within the program; it's all too easy to make a mistake when entering a long sequence of commands. When that happens, programs that don't let you edit macros force you to repeat the entire sequence from the beginning. You will also be interested in how many macros you can define and the kinds of keystrokes that can be used to invoke them. Some programs lim-

ILLUSTRATION BY STEVE LYONS

it macros to the function keys. Others allow them to be invoked only by simultaneously pressing Alt and a number or letter. Still others let you give each macro a mnemonic name of several letters.

Since almost all word processing programs with macros have a "learn" mode that watches and records your keystrokes, creating macros suited to your needs won't be difficult. Recording the tasks you want to automate can be as easy as performing them.

These macros perform useful tasks, but they only scratch the surface of WordPerfect's power. In Version 5.0 WordPerfect added a true programming language to its macro capabilities.

Nevertheless, a well-written macro must be general enough to work in a variety of situations. To this end, you may need to use more roundabout techniques to accomplish a task when recording a macro than you normally would. If your program allows one macro to invoke another, you may find it easier to break up a task into several smaller component tasks. You can record the components separately and tie them together as a last step. Never put macros that erase documents from memory or perform other potentially dangerous actions on easy-to-hit keys or key combinations.

To get you started, over the next few months we'll supply seven simple macros for some of the most popular PC word processing programs: WordPerfect, Microsoft Word, WordStar, PFS:Professional Write, and Q&A Write. Macros for WordPerfect appear on the following pages. Even if you don't use any of these programs, our seven macros will suggest ways in which the macro language of the program you do use can help you to automate everyday typing tasks.

Rather than cover every special case, our macros stress simplicity. They perform the following functions:

1. Snatching the inside address from a letter you have saved and printing it on an envelope. (You will have to save your document, position your cursor at the beginning of the address, and put an envelope into your printer before invoking this macro.)

2. Changing margin settings.

3. Transposing two adjacent letters in a word, so you can easily fix a typo like *teh*.

4. Typing a closing for a letter.

5. Indenting a paragraph and then restoring the document's original format settings.

6. Creating a header at the top right of each page with the format "Page 3 of 12."

7. Creating a boilerplate memo format.

Before you begin, be aware that whenever our macros show two keys linked by a short horizontal bar, you must press down both of those keys at the same time.

There are two ways to name macros that you record permanently in WordPerfect:

- Simultaneously press the Alt key and an appropriate letter that you will be able to remember. When you name a macro this way, all you need to do to invoke it later is to press Alt and the letter at the same time. You should use this Alt-key combination to name your most frequently used macros.
- Give the macro a name, using as many as eight letters. Longer names help you remember what your macros do and should be used for those you use less often. To invoke such a macro, press the Alt and F10 keys at the same time, type the macro's name, and press the Enter key.

The macros below perform useful tasks but only scratch the surface of WordPerfect's capability. In Version 5.0, WordPerfect added a true programming language equal or superior in power to the one you use in Lotus 1-2-3. WordPerfect's macro language even lets you create your own menus (which look like one-line WordPerfect menus).

You can store words or numeric variables for use at a later point. Using this feature, you can set up macros that automatically write the author's name. You can even perform arithmetic on variables. Macros can play back other macros.

WordPerfect's keyboard layout feature is an important extension of its macro capability. Using keyboard layout, you can use any key combination to perform an action, not just Alt-key combinations. You can control what action is performed when you press Ctrl-F10 or Ctrl–Page Down. You can even change what happens when you press the letter p. If you wanted to, you could define several different keyboard layouts and switch among them. If you use the keyboard layout to organize your macros into libraries, you will be able to easily display a list of descriptions for your macros.

Unlike earlier versions, WordPerfect 5.0 lets you edit a macro without leaving the word processor. You can pop up a list of the program's sophisticated commands and add one to your macro by just pointing and shooting.

WordPerfect includes a repeat feature that is particularly useful when building macros. Just press Esc

---

Judy Housman, a WordPerfect certified instructor, is a PC trainer and consultant based in Cambridge, Massachusetts.

C>ERASE *.*
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and type a number such as 4, and WordPerfect will perform your next action four times. If you define a macro that capitalizes the first letter of a word and then moves on to the next word, you can use this feature to capitalize the first letter of the next four words—handy if you're typing something like an address, where virtually every word is capitalized.

The power of WordPerfect's macro language is severely underdocumented. Macros are discussed in the manual's reference section, in the appendix on advanced macros, and in the tutorial. But the program also provides two aids on disk to help you master the macro language's more sophisticated features. The first is a keyboard layout called Macros, which includes a macro that pops up a minicalculator created with the macro language. Also attached to the key is a macro-defined WordPerfect-like menu that determines which font is in effect. Using the options attached to that key, you can highlight blocks of text and quickly change the font within that block; you can experiment with the macro and examine how it was created. The second aid is a Readme file that gives you additional information about the macro language.

WordPerfect 5.0 lets you make menu choices with letters as well as numbers, but we used letters in our macros to make the explanations easier to follow.

Macro 1: Create and print an envelope address from an inside letter address.

Before you use this macro, you will probably have to determine the type of envelope you're using: the macro will accommodate a three-line double-spaced address or up to six lines of a single-spaced address. Position your cursor at the beginning of the inside address of your letter before invoking this macro. Be sure to save your letter first, as this macro will erase it from the screen.

Type	Why
Ctrl-F10	Begin the macro definition.
Env Enter	Name the macro Env.
Address to Envelope Enter	Enter the macro description.
Alt-F4	Start a block.
F2 Enter Enter F2	Search for end of address (two hard returns).
◀ ◀	Move cursor back to last character of address.
Del **y**	Put address in delete buffer.
F7 **nn**	Exit document without saving.
Shift-F8 **psee** F7	Format, page, size, envelope (size), envelope (type).
Enter Enter Enter Enter Enter Enter	Add six lines of space.
Shift-F8 **lm4** Enter	Set left margin at 4 inches.
Enter F7 F1 **r**	Retrieve address from delete buffer.
Shift-F7 **p**	Print a page.
Shift-F7	Print, control printer, tell printer to start.
F7	Return to the document screen.
Ctrl-F10	End the macro definition.

Macro 2: Redefine margins.

This macro will define the entire document and set the margins to 1½ inches from the edges of the page. It will change the margin settings anywhere in a WordPerfect document.

Type	Why
Ctrl-F10	Begin the macro definition.
Margin Enter	Name the macro Margin.
Set Margins to 1.5 Inches Enter	Enter the macro description.
Shift-F8 **lm**	Format, line, margins left/right.
1.5 Enter	Enter the left margin.
1.5 Enter	Enter the right margin.
F7	Exit to the document.
Ctrl-F10	End the macro definition.

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Macro 3: Transpose two letters.

A simple way to move text in WordPerfect is to delete the text, move your cursor, and then restore the text using WordPerfect's Undelete feature. This macro takes advantage of that feature. Before invoking it, place your cursor on the first of the two letters you want to transpose.

Type	Why
Ctrl-F10	Begin the macro definition.
Alt-t	Name the macro Alt-t.
Transpose Two Letters Enter	Enter the macro description.
Del	Delete the first character.
▶	Go to the next character.
F1 r	Use Cancel to restore the deleted character.
Ctrl-F10	End the macro definition.

Macro 4: Automatic paragraph indent.

You can indent a passage in WordPerfect an equal distance from both sides by pressing the <Shift-F4> key combination. However, WordPerfect indents to the next tab stop, so if you wish to offset text to a nonstandard setting, you can create a macro like this one, which changes tab settings to 1.8 inches from the left edge of the paper, indents the paragraph, and restores the original tabs. Invoke this macro at the first character of the paragraph you wish to indent.

Type	Why
Ctrl-F10	Begin the macro definition.
Indent Enter	Name the macro Indent.
Indent 1.8 Inches Enter	Enter the macro description.
Shift-F8 **lt** F7 F7	Create a code that shows the original tabs.
Backspace **y**	Delete the tab code to the delete buffer.
Shift-F8 **lt**	Display the tab set menu.
Home Home ◀ Ctrl-End	Delete existing tab stops.
1.8 Enter F7 F7	Set a tab stop at 1.8 inches.
Shift-F4	Indent paragraph from both sides.
Ctrl-Home Enter	Go to the next hard return.
F1 **r**	Restore the original tab settings.
Ctrl-F10	End the macro definition.

Macro 5: Boilerplate letter closing.

This macro simply records keystrokes. Because WordPerfect lets you retrieve a second document into the document in memory, you could also save your boilerplate closing as a tiny file and retrieve it when you finish typing your letter. This would be somewhat easier to edit than a closing created with the following macro, but it requires more keystrokes than the macro's Alt-letter combination.

Type	Why
Ctrl-F10	Begin the macro definition.
Alt-s	Name the macro Alt-s.
Closing Signature Enter	Enter the macro description.
Home Home Down Enter	Go to the bottom of the document.
Enter	Add a line of spacing.
Sincerely yours, Enter	Type the closing.
Enter Enter Enter Enter	Leave four blank lines.
John J. Jones, President Enter	Add your name and title.
Enter Enter	Leave two blank lines.
JJJ/pcc Enter **Enc.**	Add closing initials and indicate enclosure.
Ctrl-F10	End the macro definition.

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Macro 6: Running head, "Page # of #".

This macro uses WordPerfect 5.0's new automatic reference feature to place a target at the end of a document as a means of counting total pages. It lets you specify a reference to a particular target item, and if the page of the target item changes as you add or edit the text, the number in your reference will automatically change as well. Remember that WordPerfect requires you to put in a carriage return to complete a request to position text flush right. If you wish, you can delete that return so as to avoid extra spacing.

Type	Why
Ctrl-F10	Begin the macro definition.
Header Enter	Name the macro Header.
Standard Company Header Enter	Enter the macro description.
Home Home ▼	Go to the bottom of the document.
Alt-F5 **rt**	Mark automatic reference target.
total pages Enter	Give target the name "total pages."
Home Home Home ▲	Go to the top of the document (the third Home places the cursor before any codes).
Shift-F8 **phap**	Create Header A on every page.
Alt-F6	Flush right.
Page Ctrl-**n of** Alt-F5 **rrp** Enter	Print current page number and mark automatic reference in header accepting "total pages" as reference name.
Enter Backspace	Press Return to mark end of flush right and then delete extra return.
F7 F7	Return to document.
Alt-F5 **ggy**	Generate automatic references.
Ctrl-F10	End the macro definition.

Macro 7: Boilerplate memo format.

This macro types in each memo heading and then either types in the appropriate response or pauses for your input. It makes use of WordPerfect's Date feature to pick up the system date. When you finish entering text, press <Enter> and the macro will continue.

Type	Why
Ctrl-F10	Begin the macro definition.
Memo Enter	Name the macro Memo.
Company Memo Enter	Enter the macro description.
To: Space	Type "To:" and leave a space.
Ctrl-PgUp **P** Enter	Pause for input from the keyboard.
Enter	Go to the next line.
From: Space **(your name)**	Type "From:" and leave a space and type your name.
Enter	Go to the next line.
Date: Space Shift-F5	Type "Date:" and leave a space. Use the Date feature to type in the date.
Enter	Go to the next line.
Subject: Space	Type in the "Subject:" heading and leave a space.
Ctrl-PgUp **P** Enter	Pause for input from the keyboard.
Enter Enter Enter	Skip two lines.
Ctrl-F10	End the macro definition.

If you're still not sharing your laser printer, oink, oink!

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A laser printer is expensive. That's why it makes sense to share it among more than one PC.

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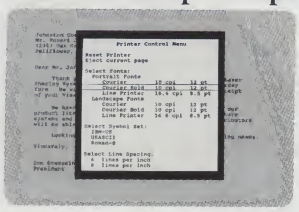

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PopDrop will also let you manipulate programs that reside in EMS—so you won't have to perform mental gymnastics just to "make room" for programs you need to run. PopDrop is an excellent tool for making different software resident when you switch to another program. And PopDrop won't interfere with your backup program.

Voted one of "The Best Of The Best Utilities" by *PC Magazine,* PopDrop is one program you shouldn't be without.

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PopDrop works by dividing your memory into layers (up to 16) each of which may contain several progams. After loading DOS and your permanent programs, RAM-resident programs are loaded with these layers between them, the most permanent at the bottom, the least permanent at the top. You can create batch files to remove layers one at a time or several at once.

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PopDrop features a remarkable animated disk tutorial that illustrates how PopDrop works and how to use it most effectively.

Control Your RAM Instead Of Letting It Control You

For example, if you want to run a RAM disk, a print spooler and one or more pop-up programs most of the time, but need them out of the way to work on a large spreadsheet, you can do it easily with PopDrop. If you need different programs resident when you switch to another application—it's no problem. In fact, you can easily use PopDrop in your batch files to make this automatic.

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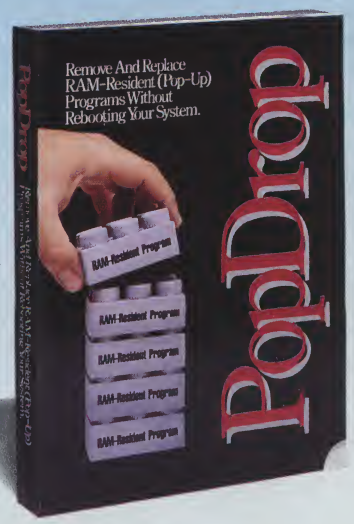

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CIRCLE NO. 263 ON READER SERVICE CARD.

CAVEAT EMPTIES

Refilling toner cartridges for laser printers: What's the story? The first in our Consumer Watch series.

By STEPHEN BANKER and DEBORAH ASBRAND

Canon's LBP-EP laser printer toner cartridges are modular marvels. They weigh just 5 pounds, provide an exceptionally clean method of printing, and easily snap into place in the laser printers that use them.

The cartridges are also disposable, and for many users, therein lies the catch. The idea that such beautiful studies in minimalism should be tossed away because they're empty of toner seems somehow, well, offensive. And if the thought of disposing of a cartridge doesn't offend your aesthetic sensibilities, maybe it rankles your Yankee thriftiness: there's just got to be a way to squeeze more use out of it.

By capitalizing on those sentiments, the business of recycling toner cartridges has grown within the past two years into a cottage industry of about 100 companies. For about one-third to one-half the cost of a new cartridge, refillers stock your used cartridge with fresh toner and also clean its inner parts of residual toner. The refilling industry is still largely experimental, and, like any new industry, it's working out procedural kinks.

Its greatest liability is that it lacks the support of Canon USA, whose EP and EP-S toner cartridges—the key part of 80 percent of the laser printers sold today—are the mainstay of the recycling business. It also lacks the support of Hewlett-Packard, which controls 50 percent of the U.S. laser printer market. Both companies assert that a cartridge operates at less than satisfactory levels after reconditioning, and that the process itself risks introducing foreign materials into the cartridge that may harm the printer.

Before they decide whether to refill or buy new cartridges, consumers who have invested in laser printers need to understand how recycling works and the process's ramifications.

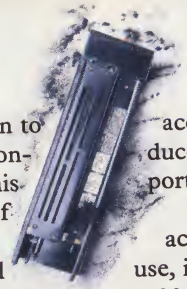
Primitive Beginnings

The first attempts at recycling were embarrassingly crude. Early recyclers simply drilled a hole into the cartridge, placed a funnel in the hole, and poured fresh toner into the empty reservoir. Sometimes they even used toner from copying machines, which has the wrong electrical charge for use in a laser printer. Then they covered the hole with some kind of tape, usually something as low-tech as duct tape.

The drawbacks to the method soon became apparent. Once a laser printer is switched on, it begins to generate heat. The tape reacted to the heat by softening and pulling away from the hole it covered. And the toner? Well, it wound up seeping out of the toner

PHOTOGRAPHY BY STEVEN GREENBERG

bay, into the rest of the cartridge, and then on to the inside of the printer. Not only was the consumer out the cost of the refill, but now his printer's insides were coated with a layer of black, sootlike toner.



Even if the tape held, the drilling method presented other obstacles. Boring a hole through the plastic case left small bits of plastic inside the cartridge. Those particles would eventually find their way to the cartridge's photosensitive drum and leave scratches. One alternative was to pierce the casing with a heated rod, thereby eliminating the filings that the drilling process left.

The problem with both techniques was that the interior of the cartridge remained unexamined. Manufacturers and recyclers agree that after printing 3,000 to 4,000 pages, a cartridge's inner parts become worn or at least dirtied. Refillers realized that if a cartridge was going to have any life at all after producing 4,000 pages, it needed more than an injection of new toner. The only solution? Disassembly.

Modern Tune-up Methods

Today, most recyclers eschew the drilling process and opt to thoroughly clean the cartridge's inner parts as well as add toner—still just a 10-to-15-minute process. Drilling procedures, in fact, have acquired such a bad name that the advertisements for many cartridge recyclers carry the words "no drill and fill," often with an exclamation point.

As a new industry, cartridge recycling attracts a mishmash of establishments: small startup companies, mom-and-pop operations, and franchiselike offshoots. Recyclers are often low-profile businesses. Most rely on word of mouth to bring in new customers; a few run small advertisements in the back sections of computer trade magazines.

Recyclers are largely mail order businesses, though local service is becoming available in some cities as the number of shops increases. Some shops buy and sell used cartridges, but a consumer's best bet is to deal with those recyclers who take in a cartridge, refurbish it, and return it to its owner. Turnaround time varies from one to five days from the date of receipt. Some shops offer overnight service.

Refilling costs have settled into a range of $40 to $65 plus shipping and handling. In comparison, new Canon EP and EP-S cartridges sell for $125 in retail stores, $90 in discount outlets. Outside the United States, the cost can run as high as $200.

The recycling business's largest customers are small desktop publishing businesses and medium-sized companies that use six to ten cartridges a month. Among the most loyal customers are public accounting and tax consulting firms, which produce enormous stacks of documentation, audit reports, and financial statements. Tax season is especially lucrative for refillers: large accounting firms with many laser printers can use, in the throes of tax preparation, as many as 12 to 30 cartridges a day.

In addition to improving their service methods, refillers have learned to handle toner with care, and many will tell you that working with the fine, powdery substance means maintaining meticulous working conditions. Both temperature and humidity affect toner. Salty air is a danger, too, as is dust, which can be deadly to the cartridge's smooth operation. Room lighting also must be kept dim to avoid damage to the photosensitive drum.

The Process

Once a cartridge arrives in a refilling shop, it embarks on a series of fairly standard steps. First, the refiller examines the cartridge's print quality by adding a small amount of toner to it and running it in one of its own laser printers. Inspection of printed copies at this stage often reveals portions of the cartridge that are especially in need of cleaning. It can also uncover more lethal afflictions, such as a scratched print drum. Drums are delicate instruments that scratch easily. A nick of any size leaves a drum—and the copies it produces—permanently marked. Reputable refillers always return unfilled any cartridges that have damaged drums.

Drums are delicate instruments that scratch easily. A nick of any size leaves a drum—and the copies it produces—permanently marked.

Next, the refiller disassembles the cartridge by removing the pins and screws and separating the toner compartment from the rest of the cartridge. A visual inspection at this stage often turns up brand-new injuries to the drum. Laser printer owners, unless they handle the cartridge with care, can scratch the drum while they remove the cartridge from the printer. Drums can be easily damaged during the reconditioning process, too.

After cleaning the drum with a soft cloth, a refiller moves on to wipe the cleaner blade and other parts.

After scrutinizing the drum and other parts of the toner cartridge, the refiller examines the fuser (or fusing) roller cleaning pad. The cleaning pad goes by a variety of names: it's also called a fixing-roller cleaner, a felt cleaner, or a wand. The pad is considered part of the cartridge, but it actually sits in a nearby part of the printer. Reconditioners will usual-

---

Stephen Banker is a freelance writer and broadcaster based in Washington, D.C. Deborah Asbrand is an associate editor of PC/Computing.

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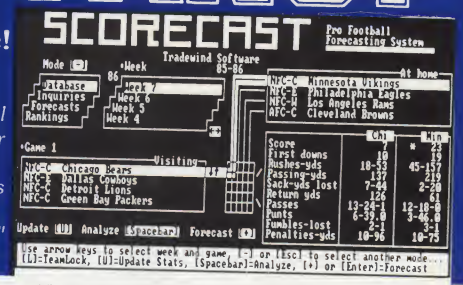

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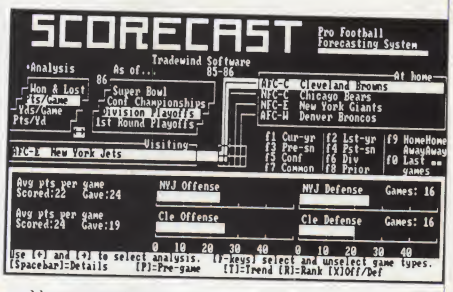

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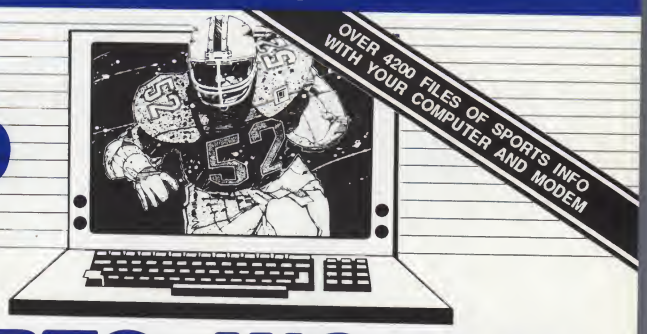

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ly clean or replace the pad, depending on its condition, but you have to remember to remove it from the printer and package it with your cartridge.

Next, fresh toner is poured into the toner bay. It's a procedure that requires precision. "Toner is as fine as flour. Just a bit of air circulating will blow it around," says one refiller, adding that careful handling also keeps the toner free from dirt and dust.

Reconditioners offer a variety of inks. There's a high-quality toner for graphics applications. Colored toner, usually in dark blue and brown, costs an additional $15 to $20. Some refillers advise against switching back and forth between colors. Once you choose a color, they suggest that you stick with it because it can leave residue and muddy the tint. (Liquid toner is also available through some refillers. It comes in vivid colors like red, green, and light blue but is extremely expensive—$200 per cartridge—and makes only 1,000 copies.)

Ready for Return

After loading in the new toner, the refiller applies a seal that holds the toner neatly in place until the cartridge is reinstalled. As with new cartridges, consumers remove these seals before they begin operating their printers. The type of closure used is important. The most reliable seals are magnetic rather than plastic. They cost more, but they're worth it: chintzy seals don't hold during transit.

Refillers perform one last step before preparing the cartridge for its return trip: they test the cartridge under operating conditions by installing it in one of their own printers and checking its performance. Willow Products, a Pittsburgh recharger that is among the largest reconditioning companies, tests cartridges for print quality upon receipt and again prior to shipping them back. Willow returns the test results to the consumer. Before it's repackaged in its original box, the cartridge is shrink-wrapped or placed in a protective bag.

The Long and Winding Road

Problems that can occur in transit are sometimes easily remedied. A particularly bumpy trip can cause toner to leak onto the transfer corona wire, the thin wire that delivers a negative charge to the surface of the paper, causing the toner to move from the drum to the paper. Streaked pages are one sign of a dirty corona wire. But cleaning the wire is easy and occasionally needs to be done under normal operating conditions. Laser printers come equipped with a corona-wire cleaner, a small tool with a brush on one end that slips back and forth over the wire to remove any misplaced toner.

Buying Smart in the Recycling Market

If you're lucky enough to own a laser printer, don't risk damaging it by using a cartridge that's been "drilled and filled." A few quick questions will help you weed out the fly-by-night shops.

1. There are many different kinds of cartridge recycling firms. Some do everything in-house: upon receipt of a cartridge, they retool it and return it to its owner. Others sell cartridges refilled by others. Almost all buy used cartridges. Know what kind of approach is used by the shop you're considering. If you do choose to send your cartridge out for recycling, note its serial number, or make a small scratch on the unit to identify it.

2. Ask about the specifics of the reconditioning process. For example, does the company disassemble the cartridge for cleaning before adding new toner?

3. Does the company have a laser printer for testing refilled cartridges on the premises?

4. Ask about the types of toner the vendor pours into cartridges. Some refillers stock an especially dense, black toner that they recommend to customers who use their printers for graphics applications.

5. Inquire about the guarantee. Is it unconditional? Does the refiller offer satisfaction or your money back? Some rechargers will guarantee their reworked cartridges against only a few specified flaws. Others limit their guarantee to 30 or 90 days. Look for a reconditioner that gives a complete guarantee.

6. If you plan to send your cartridge through the mail, inquire about the safest packaging methods and mailing policies.

The sturdiest enclosure for your cartridge is the box and styrofoam supports that it originally came in. Place your cartridge in a black plastic bag before fitting it back into the box. The bag keeps the toner, which inevitably shifts during transit, from coating the insides of your package. It also protects the drum's surface from excessive exposure to light.

If you threw out the original packaging, purchase a durable box and styrofoam packing materials. *Never* mail your cartridge without adequate protection. The cartridge contains not only the toner, but also much of your printer's imaging system—and that delicate photosensitive drum.

To ship your cartridge, use a service that offers tracking and reimbursement for lost packages. Make sure that the refilling company uses a similarly safe method to return your cartridge to you. Most companies use UPS. —*DA*

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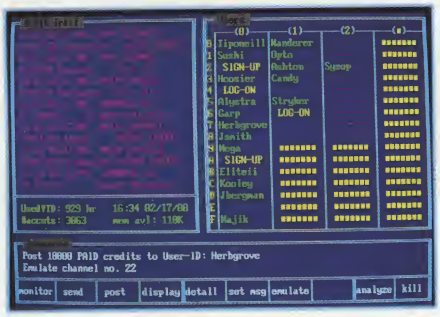

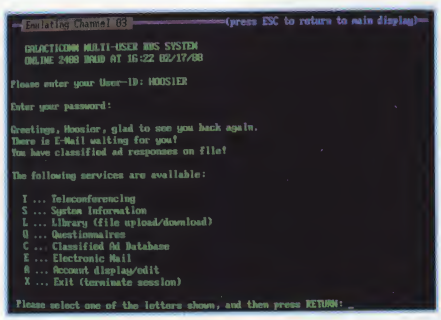

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CIRCLE NO. 253 ON READER SERVICE CARD.

Even sturdy seals can sometimes come loose during a turbulent transit to the refilling shop, causing a mess that no do-it-yourselfer would want to brave—or should have to.

The best reconditioners certify their work and guarantee the cartridges 100 percent.

Recycling your cartridges can save you money, but you must always bear in mind the principle of caveat emptor: let the buyer beware.

Most also vouch for a cartridge through three refills. They'll refill your cartridge any number of times—one reconditioner says cartridges have been reused in his facility as many as seven times—but usually will guarantee only three cycles. Refillers won't guarantee your printer, however. Most assure no liability for any damage that might occur to your printer as a result of using a recycled cartridge.

The quality of post-refill cartridge performance is a matter of contention. Refillers claim that after 4,000 pages, a cartridge has plenty of life left in it and needs only a tune-up and fresh toner. Further, they claim that new cartridges, and specifically new drums, have a break-in period of several hundred pages before they begin printing crisp, dark copies. They maintain that an important benefit of using a revamped cartridge is that since it has already been through its break-in cycle, it produces great-looking copies from the start.

Hewlett-Packard is skeptical. Not only does the company—whose LaserJet series is the largest selling line of personal computer laser printers—disagree that a drum goes through a warming-up period, it cautions against the use of retooled cartridges.

"It's just not a good idea to use the refilled cartridges," says Jane Eandi, Hewlett-Packard product manager for LaserJet accessories. "We're being viewed as the bad guys because of this policy. We hate to be heard saying that, no matter who you buy your refill from, we're going to void your warranty, because that's not true. But there have been cases where refilled cartridges have damaged a printer."

For its part, Canon has stated publicly that its major objection to reconditioners is "the unfair practice of certain refillers who misrepresent the life and capabilities of refilled cartridges."

Recycling your cartridges can save you money, but the consumer always has to bear in mind the principle of caveat emptor: let the buyer beware. ◪

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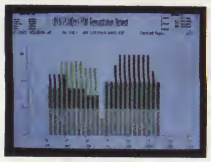

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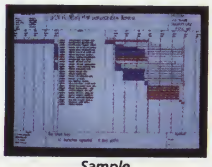

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Sample Resource Usage Bar Chart

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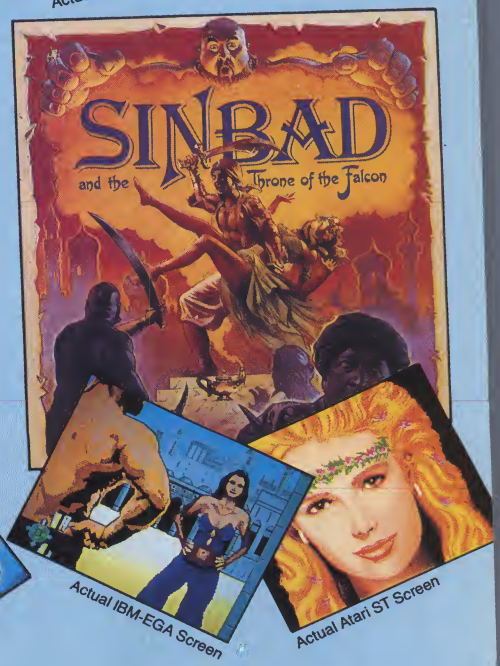

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INNER SPACE

DIGITAL AUDIO TAPE: Is it real or is it DAT, a tiny cassette that can store as much information as 3,600 floppies? By DAVID MORRISON

Imagine the scenario: An executive on the telephone with a hot prospect needs to refresh his memory about a letter he wrote a year earlier. The letter is among millions of pages of documents his company generates. He can't even remember anything about the guy he's talking to. But wait. Rather than use small talk to stall for several minutes while a secretary or file clerk races out on a time-consuming search-and-retrieve mission, he reaches into a desk drawer for a tiny tape cassette

and inserts it into a drive on his IBM PS/2. In less than 30 seconds he has the file he needs.

Digital audio tape (DAT), the medium that makes this scenario possible, already has arrived from the audio world as an efficient backup storage system for computer data. DAT technology promises to be a cost-efficient, space-efficient alternative to filing cabinets, record rooms, photo libraries, map drawers, and cases of unwieldy tubes full of blueprints and architectural drawings.

One cassette containing digital tape less than 4 millimeters wide can store 1.3 gigabytes of data. That is equal to the capacity of 65 20MB fixed disks, more than 3,600 standard floppy disks, thousands of graphics files or 5-by-7 photographs, or, in paper terms, about half a million typewritten, double-spaced pages. It is, as one vendor puts it, mainframe-capacity storage for desktop computers.

DAT is also an ideal backup medium for bookkeepers and accountants, because even a small business's monthly accounts can consume more than a megabyte of storage. With DAT, however, this information takes up only a portion of a tiny cassette. Banks and insurance companies, too, will find DAT useful for functions such as scanning canceled checks and insurance policies into their computer archives. And computer-based training companies may want to use DAT not only for backing up their development work but also for distributing their courseware to customers.

A digital tape backup system is "a perfect system for any operation that creates a lot of data," says Michael W. Harris, product marketing manager for Emerald Systems, a San Diego, California–based manufacturer of network management systems. Tape systems, he adds, provide excellent storage for data

PHOTOGRAPH BY CHRISTOPHER HARTING

D.A.T.

In the not-too-distant future, industry watchers speculate, DAT drives will be priced at less than $2,000.

that one may not need every day. "The benefit is, if you need to add a gigabyte, you insert another cassette and keep going. But when a fixed disk is full, it's full and there's nothing you can do with it except start erasing."

Physicians' offices, which contain tomes of records on paper, are also potential customers for DAT products. In the future, medical use will likely grow as high-performance graphics-based workstations are used for reading, interpreting, and storing image data such as CAT scans and X-rays.

Scores of potential DAT applications await desktop publishing. For example, a service that sells photographs or clip-art files could use digital tape to update its monthly customer catalog.

And Continental Airlines, which updates its lengthy technical manuals daily to keep abreast of constantly changing airline regulations, could simplify its desktop publishing operation by adding DAT. Frank Jaggers, the airline's PC coordinator, says his desktop operation can eat up 1.5MB of storage for a single page of text. His seven 320MB hard disks are insufficient to meet his current storage needs.

Big business will be able to use DAT to send updated software programs or customer and financial files to remote divisions—something that can be accomplished now only with expensive mainframe tape drives that use heavy spools of half-inch reel-to-reel tape. DAT technology will give corporations an inexpensive way of reproducing and transmitting software and data. A DAT cassette can be sent coast to coast for the cost of a 25-cent stamp.

DAT's future may appear rosy, but its present has a less pleasing hue. It is currently available only in an unwieldy standalone package with a price tag that would make most personal computer users shudder.

David Morrison is a freelance writer living in Marietta, Georgia.

DAT's Audio Origins

The beginnings of digital audio tape as a backup medium have more to do with your stereo than with your PC.

The technology emerged in Europe and Japan in October 1986 as a way to produce high-quality, distortion-free audio recordings. It works by converting recorded audio signals into digital data, which can be read by a computer.

These signals are then recorded on tape by a helical scan technique. Two rotating drum recording heads lay tracks diagonally on the tape, almost in a herringbone pattern, rather than lengthwise as in other audiotape recording. The alternating angle of the tracks allows them to be packed closely together—without data on one interfering with data on another.

The process is similar to that used to record images in VHS and on 8-millimeter magnetic video recording tapes, such as those sold in the home video market. The 8mm tapes have already found a niche as digital data-backup storage devices for microcomputer networks, as well as some minicomputer applications. And 4mm tape, because of its slower access time and transfer rate, is likely to be used initially for the same kind of storage and minicomputer applications.

Backing up 1.3 gigabytes of data with DAT technology takes approximately two hours, at about 11MB per minute. Such speed pales in comparison with the half-inch tapes in the mainframe world. Nonetheless, most DAT products will provide users with an average 20-second access time for records on any part of a tape.

DAT has failed to catch on as a commercial music-recording product, primarily because the recording industry fears that the ease with which digital tape can be copied will lead to increased piracy of copyrighted materials.

That same ease of copying, however, makes DAT even better for computer data storage than its cousin in the music industry, the compact disc. Although 5-inch CDs and similar 12-inch laser-read platters can handle lots of data and provide more rapid access to them than tapes can, tapes can handle more total data. And data on digital tapes can be copied repeatedly, altered, and erased—operations not yet possible on CDs. *—DM*

DAT's Video Competitors

If digital audio tape has any competition as the ultimate tape backup system, it's 8-millimeter videotape. Like DAT, 8mm tape lets you pack gigabytes of data into a small cartridge.

Functionally, the two systems are the same—just pop the cartridge into the drive, and the machine does the rest. Yet significant differences between the two media do exist.

First, 8mm video cartridges are larger than digital tapes. They use a magnetic ribbon 8mm wide—almost twice as wide as digital or audio tape. Up to 346 feet can be wound into a single cartridge about the size of an audiocassette.

Also unlike DAT, 8mm videotape is an analog medium. Sony Corporation of Japan created it to help in the miniaturization of camcorders. Home-style half-inch videotape cartridges were too large for the combined camera-and-video-recorder units. Whereas VHS equipment makers opted simply to cut the capacity of their portable-recorder cartridges by lopping a couple of inches off the cartridges and keeping the rest of the system compatible, Sony decided to redesign the underlying technology altogether.

That meant reworking the electronics of not just the signal system but also the control system, which puts the 8mm system at a disadvantage because it was optimized for analog, not digital, signals. The only existing practical 8mm backup system compensates for the problems this mismatch might cause with a powerful error correction code (ECC).

But the greatest advantage of 8mm tape is that it's already available at video stores, while DAT is locked up in legal battles.

The one currently available 8mm backup system is the Vast device, manufactured by Emerald Systems of San Diego, California. Using a modified videocassette tape transport and its own electronics, Vast stores up to 2.2 gigabytes in a single cartridge.

Using the spinning-head, helical-recording technique used by all videocassette recorders, Vast lays down thousands of diagonal tracks, each 3 inches long and .00098-inch wide. Each track has a capacity of about 12K, yielding storage for 8K of data. The rest of the track is used for the ECC code and servo (control) information. Although the tape travels at only .43 inch per second, the rapidly spinning (1,800 RPM) head has a writing speed of 148.4 inches per second.

To ensure data integrity, Vast uses a three-head system. One head writes data on tape and another then reads it back for read-after-write verification. The third head is used for servo information, which matches the head's rotation rate to the data on the tape. This combination of read-after-write verification and ECC results in an overall data error rate of one in 10 trillion. One bit might go bad out of every 500 recorded tapes.

Aside from its unusual medium and overwhelming storage capacity, the Vast system works like other Emerald backup systems because it shares the same software. It provides all the expected backup and restore options and works under either menu or command control.

The one problem Vast hasn't licked is moving gigabytes. The hardware-software system moves megabytes at a prodigious rate, up to 9MB per minute, on par with other backup systems. But at that rate, filling an entire Vast cartridge would take four hours. Rather than a coffee break, you may have time for a 16-course banquet while backing up your data.

—Winn L. Rosch

DAT tape drives, 19-inch-wide rack-mount modules, retail for more than $6,000—a price that Jaggers says discouraged Continental from adding a DAT drive to its present desktop publishing operation.

But in the not-too-distant future, industry watchers speculate, DAT drives will be priced at less than $2,000. And tape, already inexpensive compared with laser-read compact discs and 12-inch write-once, read-many (WORM) disks, will eventually be able to deliver data at a penny or two per megabyte, market analysts predict.

By the end of 1989, DAT drive manufacturers may be offering models that can be inserted in the space normally occupied by a 5¼-inch or 3½-inch microcomputer disk drive.

Its high price is not the only factor keeping DAT out of the mainstream. Access times are now far too slow for functions other than backup, and speedy retrieval software has not yet been developed.

Even more daunting is the issue of competing standards. There are now at least four DAT formats on the market, and at least two industry groups in the United States and one in Japan are meeting regularly to establish standards their members will endorse as *the* standard.

In 1987, Hewlett-Packard, based in Palo Alto, California, and Sony Corporation of Japan announced they would jointly develop DAT-based data storage products for the computer market and launched an effort to sign up other companies to license their data storage format.

Bert Vermeulen, manager of Hewlett-Packard's DAT program, based in Bristol, England, says it will be sometime in 1989 before the company brings a standalone DAT drive to market. Meanwhile, the consortium has persuaded seven independent tape

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"DAT will add massive capabilities to PCs. It just hasn't arrived yet." —John Behrman, Logistic Technics

drive manufacturers to embrace the Sony-HP standard. This is a good sign, according to California market researcher Ray Freeman, Jr., since it indicates that the competition over standards will eventually be resolved.

Meanwhile, other standard-bearers with their own data-recording formats are:

- GigaTrend, the Carlsbad, California–based U.S. subsidiary of a West German company founded in 1987 to develop data backup and storage systems. Production models of its large unit are available, and it plans to introduce a half-height 5¼-inch drive later this year.
- Hitachi America, the first company to display a DAT recorder for data. It made its standard specifications available to other manufacturers in March and plans to begin selling drives this fall.
- Scientific Micro Systems, of Mountain View, California, which has proposed its own format.

Staying out of the fray has been IBM, which dominates the mainframe tape drive market. IBM has not mentioned DAT.

The standardization issue will probably not be resolved for several years, not until standard-setting bodies such as the New York–based American National Standards Institute have spoken, and that will be long after DAT products have hit the market in force, according to Mike Peterson, president of Peripheral Strategies of Santa Barbara, California, the market research firm heading up the standardization group that includes both Hitachi and GigaTrend.

"It's crucial now for manufacturers to get something on the market to gain acceptance," Peterson says. "To do that, they have to take something and run. They are all coming to the market with a first product, and they all have the flexibility to do some fine-tuning once standards begin to emerge."

Lee Elizer, who founded Peripheral Strategies and left it a year ago to become executive vice president of GigaTrend, believes that the media has blown the standardization issue out of proportion. Elizer predicts that all DAT manufacturers will soon arrive at a common format—GigaTrend's own, he hopes. "We are not asking people to adopt our standard, but just take a look at it," he says. "It's subject for compromise, if necessary."

Standardization is crucial to the kinds of applications that will make the fullest use of DAT technology, says John Behrman, a principal in Logistic Technics, a Houston, Texas–based systems integrator. Behrman predicts that, without a standard, PC users will see a repeat of the counterproductive situation that developed when early tape backup drives were introduced.

"We spent two years looking at tape backup hardware, without any tape backup software," Behrman says. "It took the development of products like Fastback software to make the things work. "I think DAT will add massive capabilities to PCs. It just hasn't arrived yet."

As the standards issue is resolved and as access software capabilities and data transfer speeds improve, DAT may prove to be much more than simply a technology for backing up fixed disks. It could become essential to applications that generate and maintain massive image or graphics files or data archives. For this reason, Freeman predicts that by 1993 the DAT market worldwide will have grown from near zero today to 585,000 units.

DAT systems on the market now, such as GigaTrend's Giga 1200, are used primarily to back up data and software on minicomputers or large local area networks (LANs). They cannot yet be used with the 10MB fixed disk, which came as an installed feature in the IBM PC-XT in 1984. But they may gain widespread use, even if for nothing more than backup purposes.

"We are surprising ourselves with the interest that we are finding in the PC market," says Jim Hasl, Hewlett-Packard's peripherals group public relations manager in San Diego. "We originally thought this would be a product that would become a secondary system in the mainframe world. But this may well become an added option for an engineering workstation or a high-energy PC, a device that is built right into the box."

Eventually, analysts and manufacturers predict, DAT will take a prominent place in the PC world, driven as much by users' hunger for more storage space as anything else. "Let's face it," says Peter Behrendt, president of Exabyte Corporation, a Boulder, Colorado–based manufacturer of tape drives. "Most PC users don't need a gigabyte of storage. But they will."

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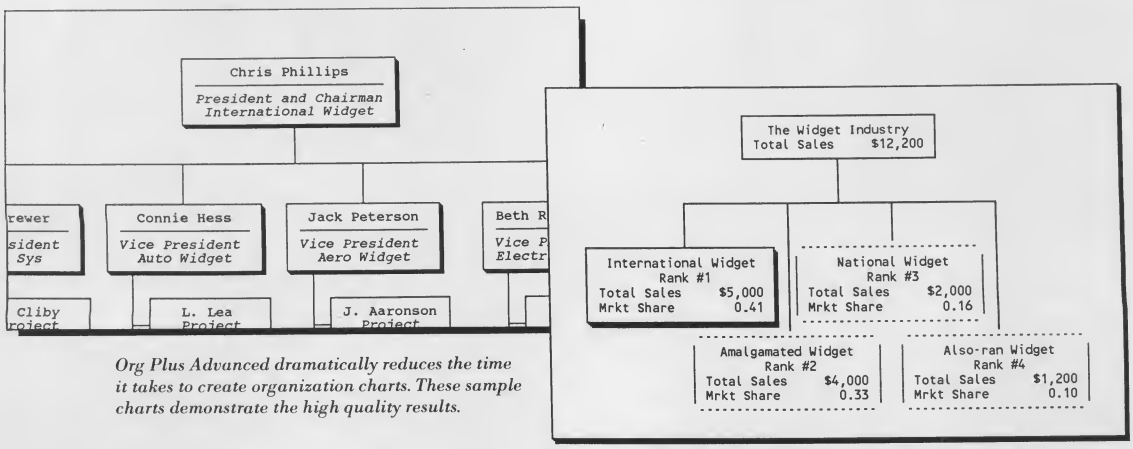

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TOOLKIT

By WINN L. ROSCH

Using one word processor to edit or print the work of another is like having a five-year-old decipher a French menu: the results are at best unpredictable. Just rev up your computer and try to read a document written on a word processor different from your own.

At worst, you won't see the file at all. More often, the text will be interspersed with strange codes and arranged so oddly that it would make e.e. cummings proud. Or it may look fine on the screen but turn out to be impossible to edit—the file has been electronically petrified and defies your efforts to modify it.

One way out of this thicket would be for everyone to use the same word processor. That's not likely to happen. We can hope that, down the road, word processing vendors will agree upon standard codes—a sort of software Esperanto. In the meantime, our best chance lies in file conversion software—programs that can, in mere seconds, translate the jottings of one word processor into a form decipherable by others.

Some word processors are able to translate files created in other programs, but they can handle documents in only a few of the most popular formats. Conversion software, on the other hand, lets you edit, print, and archive documents in almost any format.

How It All Started

The need for file conversion software arose almost as soon as the first PCs began pushing typewriters off desks. At the time, MicroPro's WordStar was far and away the best word processor. Originally designed for the prehistoric CP/M operating system, WordStar was reprogrammed to run on PC-DOS.

ILLUSTRATION BY ANTHONY RUSSO

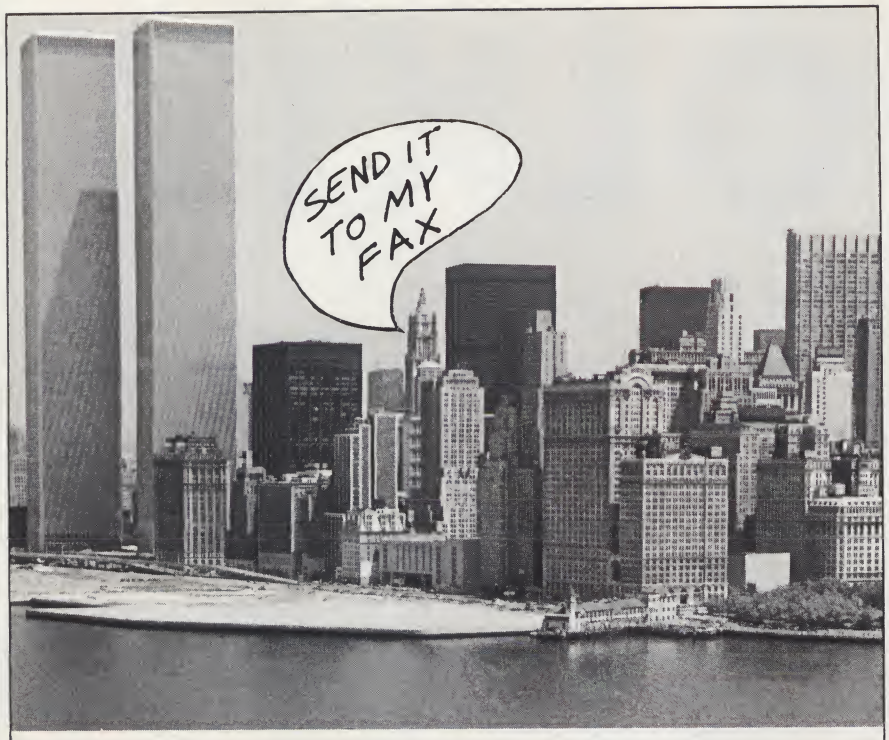
Thus arose the first need for file conversion software. Most word processors preserve your words in ASCII, a data storage scheme that assigns a 7-bit value to each letter, number, punctuation mark, and special symbol.

One word processor for everyone? Dream on. Instead, get Software Bridge to convert files from different formats.

WordStar, *however*, *tramps* across the ASCII conventions into the unknown reaches of the IBM extended character set. One bothersome quirk is the program's oddball treatment of the final character in every word. WordStar switches the high bit of these characters' ASCII codes from 0 to 1. It also switches the high bit to designate "soft" carriage returns and hyphens, which mark line ends that do not break into new paragraphs. Other programs, including DOS, can't make much sense out of a WordStar file.

To make these arcane files readable to other programs, a new form of application program arose. "Stripper" programs chewed through WordStar files and turned the high bits back to 0, thus converting the characters they coded back to standard ASCII form. For a time, strippers ranked among the most popular programs exchanged through user groups and bulletin boards.

But as other editors and word processors began to appear, so did other file format difficulties. Various word processors used different methods to mark line ends and



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paragraphs. WordStar uses soft carriage returns (i.e., without switching the high bit) to indicate line ends and hard returns for paragraph ends. Other word processors treat each paragraph as one long line for purposes of text storage, formatting it on the fly for screen display. Still others behave like typewriters and plunk a hard carriage return at the end of each line.

Such minor differences can be dealt with through reformatting instructions or a word processor's own search-and-replace function. But real chaos arises from a seemingly innocent party: the printer. Each new model of printer brings with it new features and abilities, new flexibility in line heights and character pitches, and new font choices.

Word processors must encode commands to take advantage of these printer features. And somehow these codes must be kept with the text you want to print, keyed to the exact place where changes are to take effect. In addition, a family of commands is needed to handle proportionally spaced text, multiple fonts, graphics embedded within text, and snaking columns. Each word processor uses its own codes for these functions. Some codes consist of nonprinting ASCII characters; others are strange combinations of letters. Generally, one word processor has no idea what the codes of another mean.

In theory, file conversion is straightforward. A program need only read the text, look up the meaning of any printer control codes, and substitute the equivalent commands for the format you want to use. The conversion program itself winds up being relatively simple.

In fact, however, many complications may arise in the process. Functions specified by one or two characters in one word processor may require a full line of code in another. And some word processors count in inches, while others use points, picas, or more obscure units. And to make matters worse, some word processors have functions, fonts, and commands that others lack entirely.

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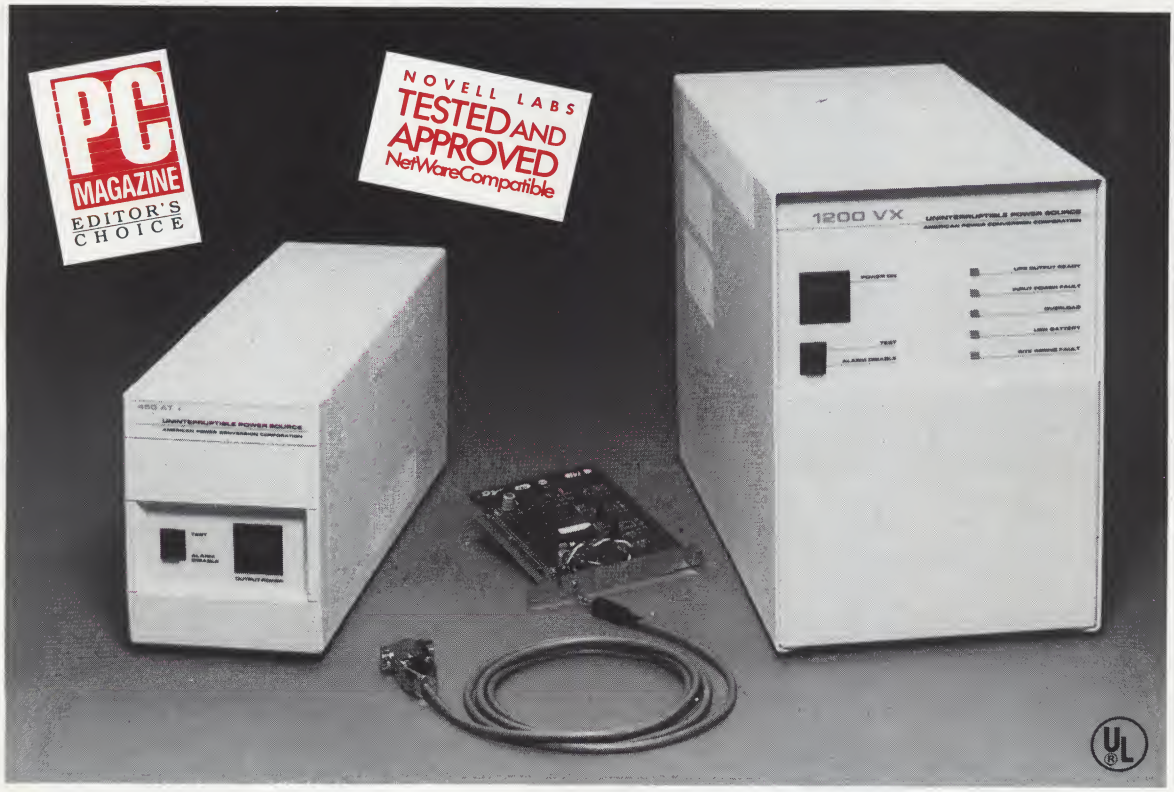

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TOOLKIT

word processors. You can translate files to and from any of them. In contrast, most file converters work only on specified pairs of word processors.

Experienced users can control its operation directly at the command line by entering source and destination filenames and file formats. Novices can lean on an elaborate menu system to get the job done. Software Bridge's main menu lets you choose a pair of programs from the list of word processors whose files it can translate. Thereafter, a one-character command converts either way between the two formats.

A wealth of setup options allows you to change the layouts of documents as part of the conversion process. For instance, you can instruct the program to alter page length, margins, and type styles as it translates from one word processor to another. And Software Bridge remembers the last options you chose, so you don't have to go through the selection process each time you convert a file. The program also allows you to queue files for conversion.

Software Bridge works with most important word processors, including Microsoft Word, WordPerfect, WordStar, Sprint, and Volkswriter. Notably absent from its repertoire are XyWrite, PFS:Write, and PC-Write. The results are not always flawless, but they're the best you're going to get without rekeying each file by hand. ◪

Winn L. Rosch is a contributing editor of PC/Computing.

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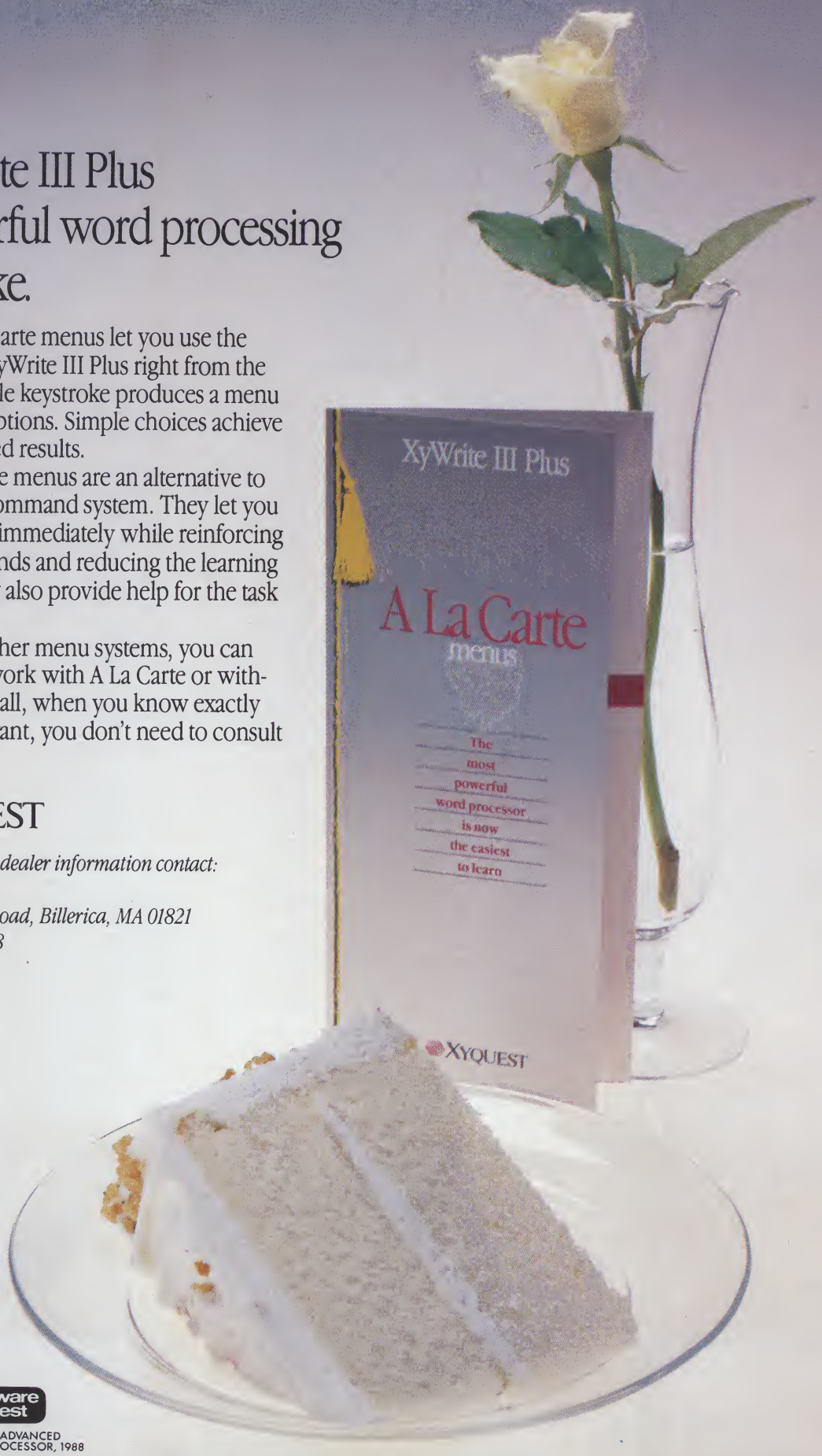

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DOS

By PAUL SOMERSON

As the song says, backing up is hard to do. Most new users start out with good intentions and make periodic archive copies of their important data for a week or two. This isn't too difficult when typing a simple COPY *.* A: command will handle it. But as their hard disks start sprouting subdirectories and filling up with files, users quickly find the job far too complex.

Backing up your programs and data on a daily basis would be absurdly wasteful and time consuming. Programs themselves rarely change, and most users work on only half a dozen or so data files each day. Unfortunately, the few that you've just created or modified may be scattered across your disk, which could mean logging into lots of different subdirectories, hunting down files with laborious Dir searches, and then copying them one by one to diskettes.

To make matters worse, the DOS Copy and Backup commands each have major flaws. Copy wasn't designed to deal with subdirectories (after all, it was written for the PC-1), or with files too large to store on a single diskette. It can't figure out which files you've recently changed and which you haven't, its operation is painfully slow, and it won't work with unformatted floppies.

The Backup command can solve all these problems. But it stores the copies it makes in a special format that renders them impossible to use until you process them with the DOS Restore command.

ILLUSTRATION BY MIKE KLEIN

Big Blue to the Rescue

With DOS Version 3.2, IBM (not Microsoft) introduced Xcopy, a powerful "external" DOS command that takes the sting out of copying and backing up files. Unlike Copy, which is an "internal" command located inside the Command.com file, Xcopy resides in its own Xcopy.exe file on the DOS diskette.

Floppy users should copy Xcopy.exe onto their main startup disk. Hard disk users should make sure Xcopy.exe is in their C:\DOS subdirectory, and that their Path command knows to look in this directory. If you don't currently use a path, add a line to your startup Autoexec.bat file that says PATH=C:\DOS.

Unless you're a Zen master, using the Copy command to back up several dozen related files from one disk to another will sorely try your patience, as DOS reads a file from one disk and then copies it to the second, then goes back and reads another from the first, then writes it to the second, and so on until it's churned through every last one. But Xcopy reads as many files as it can from the original (source) disk into memory in one gulp, then writes them to the backup (target) disk all at once.

While Copy stumbles over subdirectories, Xcopy is deft at cutting them down to size. Normally the Xcopy command will work its magic only in the directory that you're currently logged into. But by adding an /S parameter (or switch) at the end of the command, you will be able to have Xcopy copy its way through all of your subdirectories.

Best of all, when you tack on an /S switch, you don't even have to create the basic structure of subdirectories on your backup disk; Xcopy will take care of that for you. Xcopy /S will start with whatever subdirectory you specify and then work downward—that is, away from the root directory.

To copy every file in every subdirectory on your C: disk to a backup floppy in drive A:, you would type:

Unless you're a Zen master, you'll want to Xcopy—not Copy—your files.

```
XCOPY C:\ A: /S
```

The C:\ tells it to start at the root directory (which DOS refers to with a simple backslash) and copy all files (except for special hidden ones) that it

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G - GENERAL LEDGER                                  O - CHANGE DATE
P - ACCOUNTS PAYABLE                                X - MONTH END PROCESS
R - ACCOUNTS RECEIVABLE                             * - EXIT TO DOS
W - PAYROLL CHECKWRITER

                              ** PAYROLL **
?<== SELECT YOUR OPERATION
     * YOUR INPUT *      * REPORTS *        * SPECIAL FUNCTIONS *
A - ADD EMPLOYEES        1 - CHECK REGISTER  C - CORRECT EMPLOYEE
G - GO RUN PAYROLL       2 - PRINT CHECKS    R - REDO PAYCHECK
                         3 - MASTER REPORT   Y - YTD BALANCES
                         4 - EMPLOYEE ID LIST L - PRINT LABELS
                         5 - TAXES SUMMARY   U - YOU CONFIGURE
                         6 - QTRLY TAX LIST  | - SPECIAL MAINTENANCE
Z - RETURN TO CONTROL    7 - W2'S
                                             LAST CK DT: 12/15/87
                                             LAST EMPL:  187
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DOS

finds to the disk in the A: drive.

Sometimes users create subdirectories that don't have any files in them. If you want Xcopy /S to copy empty subdirectories along with the ones that do contain files, you have to add an /E switch along with the /S. Otherwise DOS will adapt the subdirectory structure on the backup disk to eliminate empty subdirectories. If it's critical to

After an initial backup, you need to copy only those files you've modified. Use the /M switch.

keep the structure on your backup disk precisely the same as on your original disk, use an additional /E whenever you use an /S.

Speeding Things Up

The first time you back up your disk, it makes sense to use /S to navigate through your directory tree and copy all your files. But each subsequent time, you need to copy only the ones you've created or changed since the most recent backup.

DOS makes this a snap by using the disk's directory to store the name and size of each file, and the date and time it was created or last modified. The directory also keeps tabs on each file's attributes, which, among other things, can tell the system whether you've already backed up your files using the standard Backup command or Xcopy with an added /M switch. After you've run either of these commands once, you can use Xcopy /M or Backup /M to copy your files; DOS will determine which of the files have not changed since the last Xcopy or Backup and will simply skip over them.

DOS can determine if you modify even one character in a file. The next time you use Xcopy /M or Backup /M, DOS will see that the file has been changed and will copy the newly modified file.

Automating Backups

Several other switches can make backups easier. If you add a /P to Xcopy, DOS will list all the files it's about to copy, one by one, and ask whether you really want to copy them. Type a Y and Xcopy will back up the file; type an N and Xcopy will skip over that particular file and ask you about the next one it

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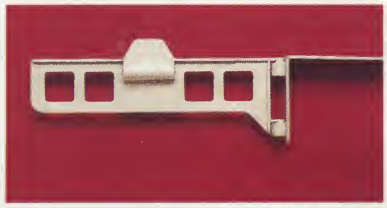

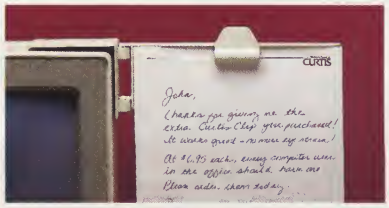

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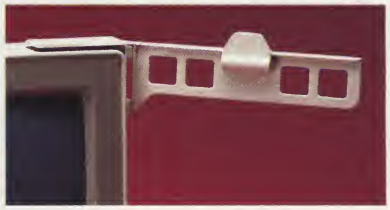

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finds. This is useful if you want to move some—but not all—of your .bak backup files to an archive disk and rename them in the process by giving them .old extensions. Just type:

```
XCOPY C:\*.BAK A:*.OLD /S /P
```

Then, when you're done, you can delete all the .bak copies remaining on the original C: drive.

You can also add a /W to have DOS wait for you to insert a floppy disk before churning away, or a /V to verify that DOS did indeed write a copy of the file to your backup disk.

But the most useful switch of them all is /D.

By slapping on a /D switch and a date (in :mm-dd-yy format), you can tell Xcopy to copy only those files that were created or modified on or after the day specified. So if today's date is October 1, 1988, and you want Xcopy to back up only those files you created or changed today in every subdirectory on drive C:, you can type:

With a /P switch, Xcopy will list files one by one and ask whether you want to copy each.

```
XCOPY C\ A: /S /D:10-1-88
```

If you've worked on a lot of files that day, you may fill up the floppy in drive A:. To get around this, as the DOS manual points out, you can specify an /S and an /M together. Each time DOS informs you that the disk is full, put a new, blank, formatted disk in drive A:, and repeat the same Xcopy command until you're all done.

While Xcopy is clearly the best way to copy and back up most files, don't ignore the Copy command. It's very useful for dispatching some special tasks that Xcopy is just not capable of handling.

Xcopy is adept at copying files from one disk to another. But it can't copy to a DOS "device" such as a printer, screen, or modem.

Next month, we'll be talking more about Xcopy and DOS attributes, and we'll give you tips and examples on how to use Xcopy with switches to automate your backups completely. ◪

Paul Somerson is editorial director of PC/Computing.

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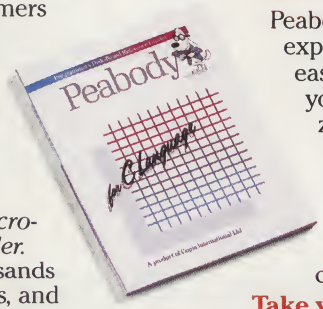

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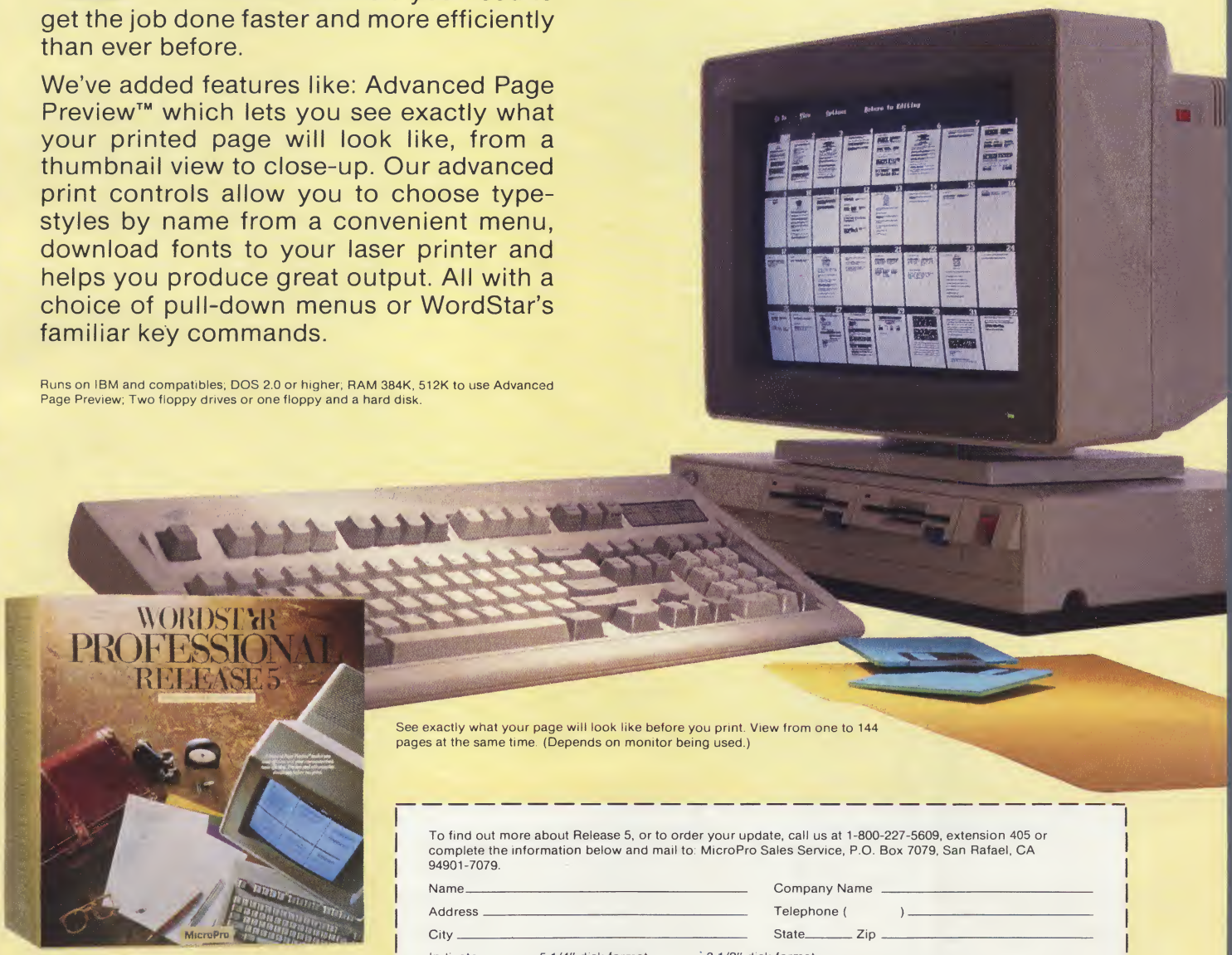

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ASIATECH

By ANNA FORTIG

The life of a Japanese business computer dealer is not an easy one. The lack of standards among major PC makers and a dearth of business customers have made for tough selling and low profits. Recently, however, hope has glimmered on the horizon for Japanese computer retailers: more people are buying increasingly sophisticated products. In response, dealers must now take a number of steps to ensure their future prosperity.

Along the way, Japanese computer retailers must learn to market more complex computer systems to increasingly sophisticated buyers. In addition, they must add value to the systems they sell so that they can compete with other computer vendors.

"Japan has had problems with standardization," says Nagayoshi Nakano, an analyst in Dataquest Japan Ltd.'s Personal Computer Industry Service. As a result, Japanese retailers must contend with completely different products from different vendors, stocking operating systems and software for each hardware platform they sell.

Those who sell NEC personal computers fare better, because NEC's PC9800 commands the lion's share—about 80 percent—of the business computer market. NEC took that lead while major manufacturers such as Fujitsu, Hitachi, and IBM Japan were focusing sales on their existing mainframe customers, who used personal computers as terminals. NEC went directly after the personal computer market as one that was separate from its mainframe business. As a result of this strategy, the company has about 6,300 total resale outlets, 285 of which are its affiliated NEC Micron Shops. And NEC's large customer base has helped to create a third-party software and peripheral industry that has proved quite lucrative to stores.

Now there is even a compatible laptop version of the PC9800 made by Seiko Epson. In some stores, it outsells NEC models, says Nakano. The Seiko Epson machine has given the stores a little more leeway by allowing them to offer customers a choice of similar computers with different features and a range of prices. The like architectures also let retailers leverage their support activities.

Besides the NEC products, until recently there have been no other standards in Japan. But that's been changing, too. Toshiba does offer the bilingual (English/Japanese) IBM-compatible J3100 laptop, which allows computer dealers to add to their coffers by selling the large variety of English-language software that is currently available for the IBM PC.

Traditionally, some computer makers have combated the standards issue by selling their products into vertical markets—a boon for dealers who pick up the systems and a problem for those who don't.

IBM Japan, for example, inched its way into the market using niche market distributors and dealerships. The company formed alliances with experts in vertical markets who could develop specialty programs for its products and then also sell them.

"The very reason IBM Japan is succeeding is that it is focusing on [vertical] markets," says Nakano. "It picked up one distributor in each industry, such as food, gas stations, or construction, to sell its products." One of the better-known alliances is with Suntory Liquor, which resells IBM Japan's Japanese personal computers with its own liquor store business software.

This niche market trend actually hurts general retail computer stores, which get bypassed when manufacturers seek specialty distributors, according to Nakano.

IBM Japan has two large primary dealers (with 130 affliated stores) through which it sells 35 percent of its IBM 5550 series Japanese personal computers. IBM's sales network also includes 120 nonaffiliated computer stores, according to figures from analyst firm James Capel Pacific Ltd.

Business customers are beginning to come back to Japanese computer stores. About 1.2 million personal computers were shipped in the Japanese market last year, according to Dataquest Japan figures. Even more shipments are expected this year, in large part due to an increase in sales to business, says Nakano.

But these customers are more savvy, demanding more service and value than customers past. Japanese computer retailers lag about five years behind U.S. computer merchants, who recognized early on that if they were to survive in the personal computer market they needed to add value to their products, Nakano says. Now, in order to court business buyers, many dealers in Japan are creating customized software for business customers and adding after-sale service and support. The dealers may then sell these bundled systems for ten or more times the price of the hardware alone.

Japanese computer dealers lead tough lives: PC standards are few, and customers are becoming more demanding.

"One of the biggest trends now in retailing is that customers, especially businessmen, *want more support*, like that offered by Businessland and ComputerLand in the United States," says Keiichi Maesato, a technology analyst

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at James Capel. "The personal computer itself is not enough, so more and more retailers will go in the direction of value-added resellers."

Another feature that appeals to business customers is the nearest thing to a legitimate standard the Japanese personal computer has—the AX. The AX is an AT-compatible bilingual personal computer standard backed by more than 100 companies in Japan. Computer dealers are making the switch from 8-bit MSX-standard computers (MSX is an 8-bit standard created by Microsoft) to the 16-bit AX models.

Maesato expects the AX to be a godsend to all stores selling computers, because the machines run standard Japanese- and English-language operating systems. Before the AX, bilingual PC-compatible models could run English-language applications because they used MS-DOS, but the Japanese operating systems differed from maker to maker, he explained.

"The AX will make a big difference for retail stores," says Maesato. "There will be more choice of software. That [software] is why NEC has been dominant."

By adopting these changes, Japanese computer retailers may be better prepared to face growing competition from other distribution channels. Nakano expects some of Japan's 2,000 personal computer stores to disappear as competition heats up. Other outlets for Japanese PCs include home appliance shops, specialty office equipment stores, discount stores, and office computer dealers.

Discount shops, which have sold hobby computers, and office computer dealers, which have sold large-sized office systems, will have a hard time making a switch to 16-bit personal computers, but Nakano expects them to try. And although specialty office stores have developed strong customer bases by selling facsimile and copier equipment—but not personal computers—Nakano expects them to branch into the personal computer market, taking advantage of their good relationships with businesses and schools situated near their shops.

Business computer stores are also being challenged by Japan's top ten trading companies, including Kanematsu-Gosho, Mitsui, and Nissho Iwai.

"Trading companies are very interested in the personal computer market as importers and exporters to and from the newly industrializing economies [Hong Kong, Singapore, South Korea, and Taiwan]," says Nakano.

The strongest competitive threat to computer dealers posed by the trading companies is their widespread distribution networks. "To set up a retail network is very difficult, and they already have their own networks," Nakano explains.

Trading company Nissho Iwai, for example, has teamed up with leading Japanese software firm Japan Systems Engineering (JSE), Kobe Steel, Nippon Life Insurance, and eight other firms to form Season Soft Plus, a franchise operator.

The Season Soft Plus stores will sell business personal computers and packaged and custom software to small- and medium-sized companies and single proprietorships. Nissho Iwai will pump

Nakano expects some of Japan's 2,000 personal computer stores to disappear.

in financial backing and marketing clout, JSE will contribute software know-how, and the other firms will bring additional distribution capabilities through their vast branch and sales office networks. Season Soft Plus plans to begin operating in November with several franchise outlets and directly managed stores in Tokyo and Osaka. By March 1991 the chain hopes to have 38 sales outlets.

JSE's tie-up with the major trading house exemplifies the struggle required to get a personal computer distributorship up and running in Japan. Despite the large existing networks the traders bring to such enterprises, they are latecomers to the personal computer industry and must learn the business. As Nakano sees it, trading firms must quickly acquire that expertise, through agreements with software firms and value-added resellers or by targeting a specialty market so they can offer more to customers than off-the-shelf hardware and software.

Still, Maesato says, the huge trading companies—even more than existing computer retailers throughout Japan—have a tough uphill climb. ◪

Anna Fortig is a correspondent living in Tokyo.

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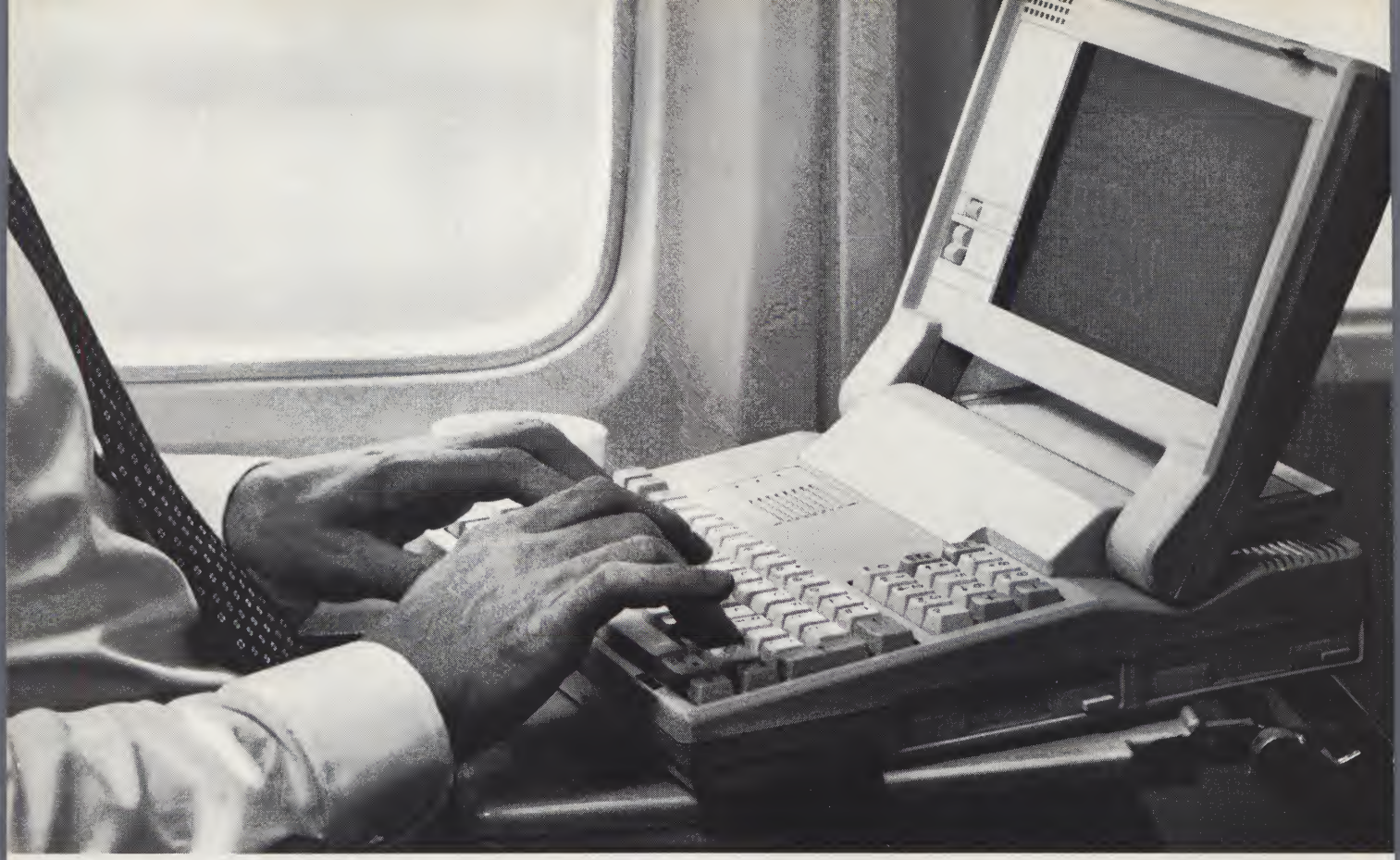

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CONNECT

By DOUG VAN KIRK

Did your most recent electronic mail bill make you wonder whether it wouldn't have been cheaper to fly? Are smoke signals beginning to seem more convenient than your communications software? Are you starting to think homing pigeons might be an easier way to transfer files from one location to another?

If you answered "yes" to any of those questions, and if you send a fair number of electronic messages, it may be time for you to give up on commercial electronic mail services and set up your own private system.

Private e-mail networks run on a company's own personal computers and offer an alternative to public e-mail systems such as MCI Mail or EasyLink. By their very nature, private systems restrict communications to users who have authorized access, and they provide complete control.

Once a private system is bought and installed, the operating savings can be dramatic compared with commercial e-mail costs. While public e-mail services often charge $1 or more per message, a private e-mail system's overhead may be no more than the cost of a one- or two-minute phone call.

Walt Will, a manager with Countrymark, Inc., says the potential saving was a major factor in his firm's decision to turn to a private e-mail system. Countrymark, an agriculture cooperative based in Delaware, Ohio, uses its new system to stay in touch with its 90 regional field representatives, as well as with other employees who may be away from the office. The private system handles an average of 100 calls a day and processes as many as 300 active messages at a time.

According to Will, Countrymark's e-mail system runs up a monthly phone bill of about $225 for the toll-free number used to reach the central station. At $1 per message, Will adds, "MCI Mail would cost us a lot more."

PC-tPost

The heart of Countrymark's system is PC-tPost, from Coker Electronics. The PC-tPost software package is built around a program called tPost Central, which turns a PC and modem into a central mail station that processes all of the messages. Remote users, who must be equipped with PC-tPost, merely select the Send option from the program's menu. The rest of the process is automatic: PC-tPost dials in to the central mail station, delivers the message, and then picks up any mail that is waiting for the remote station.

ILLUSTRATION BY WENDY WORTSMAN

According to Charles Coker, vice president of Coker Electronics, the entire mailing process takes just a minute or two, so even callers to crowded systems rarely have trouble getting through. If a caller does get a busy signal, PC-tPost automatically waits a few seconds and tries again. To keep connect time to a minimum, users compose their messages offline with a simple editor included with the package—or any ASCII editor, such as the notepad in SideKick.

To keep messages humming through the system, PC-tPost includes a number of housekeeping functions that control deletion of old messages, password security, and remote-site polling. In the polling mode, the central mail station automatically calls some or all of the remote sites to exchange messages or data. Polling can be set to run after hours to keep down costs.

Private e-mail systems offer a low-cost way to keep e-messages buzzing through your e-network.

Installation and setup of PC-tPost is quick and simple. Even users with little communications expertise should have no trouble getting their e-mail network up and running in a few minutes.

It is in the user interface, little more than a list of options selected by pressing a function key, that PC-tPost falls short. Key definitions vary from one menu to another, and the program offers no shortcuts to let experienced users sidestep the menus.

Worse, the program's requests for confirmation of almost every action are the PC equivalent of snow, rain, heat, and gloom of night. They may not stop the e-mail from getting through, but they will slow down any tPost-man.

Mail-Server

The 3X USA Corporation takes a different approach to private electronic

mail. Its Mail-Server software allows direct communication among subscribers on the system. Unlike PC-tPost's tactic of using a central PC dedicated to storing and handling messages, each PC in a Mail-Server network forwards e-mail messages directly to the intended recipient, who is notified by a pop-up window that a message is being received.

Used in this manner, Mail-Server delivers electronic messages almost instantly. It's an efficient system, but it does have some drawbacks. To work correctly, the program must be installed and active on the receiver's computer; otherwise the message simply can't get through. And because Mail-Server resides in memory, occupying at least 84KB RAM, it may end up interfering with the use of other memory-intensive programs, such as spreadsheets. In addition, the sender must pay for the phone call, which may discourage use of the system.

If Mail-Server is not loaded into memory, a sender must call the recipient and warn him that a message is on its way. This may seem like more trouble than it's worth; luckily, 3X USA has also configured Mail-Server to run the way PC-tPost does, with a central mail station maintaining mailboxes for remote callers.

Mail-Server is a powerful package with a variety of options that make it flexible enough for most e-mail needs. Unfortunately, users may discover these features only after considerable trial and error. The manual amounts to little more than a reference guide to the program's modules, and it never really explains exactly what Mail-Server is or how to use it.

Prospective purchasers of either PC-tPost or Mail-Server must carefully weigh the initial investment and inherent limitations of a private e-mail system against the potential cost savings over the long term. Neither package allows public communication; all users must possess the appropriate software and be identified to the system. And in many companies, administration of a private e-mail system could become a major headache. But both packages offer a low-cost way to send lots of electronic messages to a selected—and consistent—group of people. ◪

Doug van Kirk is an associate editor of PC/Computing.

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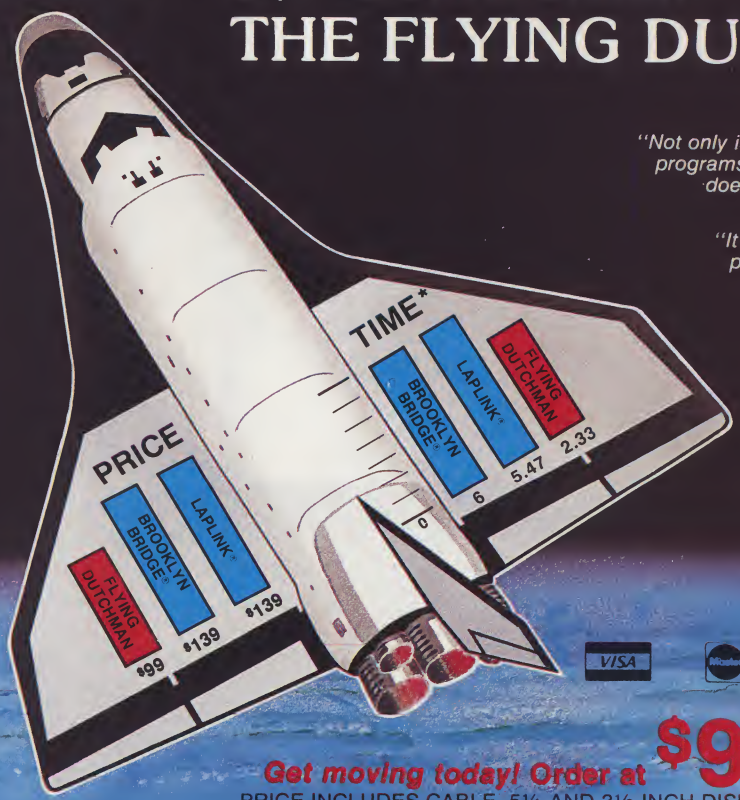

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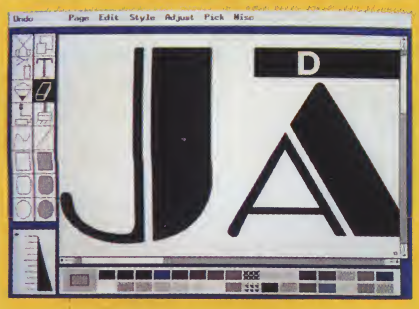

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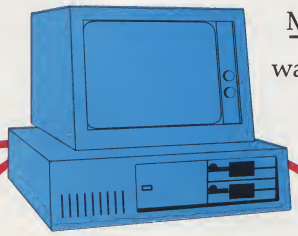

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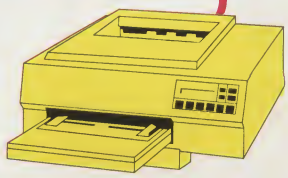

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MEDIA

By CAROL OLSEN DAY

As every flack knows, one way to hype a book is to surround it with controversy, and one of the best ways to do that is to publish it as an "unauthorized" biography.

For the authors of *The Ultimate Entrepreneur* (Contemporary Books, 1988), an unauthorized biography of Digital CEO Ken Olsen, that wasn't difficult to arrange. But it did mean that they had to do some digging—and, apparently, some mind reading.

Glenn Rifkin and George Harrar, both editors at *Computerworld,* researched and wrote the book, which is subtitled *The Story of Ken Olsen and Digital Equipment Corporation.* The scoop is that Olsen refused to cooperate. The authors say that the CEO even issued a memo ordering Digital employees not to speak with them.

Olsen, described in the book as "an engineer dressed in the role of a business leader," is not only wary but sometimes downright hostile to the press. Apparently he has even banned certain publications from Digital's press conferences. One reporter we know recalls being sent by his newspaper editor to cover an Olsen press confab—actually, to take notes for a magazine owned by the same company. Olsen had barred the magazine's staff from the event, but its editors found a way around the embargo by "borrowing" the reporter from the other publication.

The CEO's aversion to the fourth estate will not be news to industry insiders, but it does attract readers, especially when the subject is as intriguing as Olsen—the man *Fortune* called America's most successful entrepreneur—and when the company is as successful as Digital, IBM's chief rival and the largest employer in Massachusetts and New Hampshire, with, the book tells us, "33.6 million square feet of space in 62 countries, a market value of $23.9 billion (tenth among all U.S. companies), 475 sales offices, $11.4 billion in revenues, $1.3 billion in net profits," and a rank of 38 on the Fortune 500.

It's no mystery how Rifkin and Harrar came up with these hard facts. What's puzzling is how they knew what went on in Olsen's mind:

"To Olsen, a fall chill seemed to be always in the air."

"Olsen knew that while he may have deserved some of the criticism, the picture was not nearly as dismal as it was painted . . . Things were going to be different, he believed . . ."

"It became clear to Olsen that all the chest thumping in the world was not going to change opinions."

"He was bemused by the sudden change in the perception of him."

COURTESY CHARLES BABBAGE INSTITUTE, UNIVERSITY OF MINNESOTA

"Deep down, Olsen knew that the reorganization of the company had cut DEC open . . ."

To be fair, Rifkin and Harrar did discover a lot about Olsen, because, as they point out in the book's preface, some longtime executives at Digital could not refrain from talking. Plus, they had "years' worth of material—interviews, profiles, facts, and figures—to draw on from our coverage of DEC as editors at *Computerworld.*" They say that what they "pieced together is a story of an American entrepreneur with no counterpart in style or substance."

Is hype contagious? Telltale books about the computer industry have got the fever.

Olsen-bashers have their say here, but this is not a trashy exposé. Do inquiring minds really want to know that Olsen is:

"Honest, decent, religious, paternal, stubborn, intuitive, commanding, charismatic"?

"The gentle soul . . . the simple man, unadorned by his wealth, estimated in mid-1988 to be $280 million in DEC stock alone . . . drives a Ford Escort van, which succeeded his Ford Pinto"?

"The outdoorsman, flying off to the wilds of northern Maine at the controls of his single-engine prop plane . . . the antagonist, interrupting a young vice president in midsentence . . . with a terse 'Don't waste any more of our time' "?

Harrar and Rifkin also divulge that Olsen doesn't drink, smoke, or swear, and—no surprise—that he can be boring.

The picture of Olsen that emerges is one of a dynamic, strong man, a man some people love to hate and others hate to love. The book claims, "In 31 years of paternal grace and scorn, he has touched people's lives beyond their careers, taking some to their summit,

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bringing others to emotional ruin." You can read this as hyperbole or as a statement true of any strong leader.

The book's final acknowledgment reads, "And a deserved scratch under the chin to Fluffy and Tiffany." Did Fluffy and Tiffany contribute some of the catty remarks? Or perhaps they're the source of some of the book's fluff.

The real value of *The Ultimate Entrepreneur* lies in its detailed account of the founding and growth of Digital, a company praised by the authors of *In Search of Excellence* for its matrix management structure (in which product line managers act as entrepreneurs) and regularly cited as one of the best places to work, even for women and minorities.

The reporting, for the most part workaday but thorough, is stronger when Rifkin and Harrar are describing the early days of the company, particularly the development of the matrix management structure credited for Digital's explosive growth. The accounts of the company's smash hits in sales and on Wall Street, and of the challenges from IBM and AT&T in the mid-1980s, especially the fierce Digital-IBM rivalry, are grist for a Harvard Business School case study.

As for the hype about the book being an unauthorized biography of Olsen, one person quoted in it says, "The best and worst thing you can say about Ken is that he's a human being, like the rest of us." Unfortunately, simply being human doesn't sell books.

A computer book that begins with the words "Ed Peccarella first realized something was wrong on a hectic day in January 1985" doesn't rate high on our list of must-reads, but we decided to delve further anyway. After all, this was *The Computerized Society,* the latest volume in Time-Life Books' Understanding Computers series.

The late-night TV pitches for the books made us eager to see what Time-Life has been writing about computers. We found that it was nothing new—in more ways than one.

First, Time-Life introduced the series of 24 volumes (17 have been completed) about three years ago, but the advertising calls the series "new," and the books are available one at a time, but not always as a complete set. Second, the material is not up to date, nor is it designed to be. To keep the series from quickly becoming passé, Time-Life has focused more on computer history and principles than on the latest hardware and software developments.

You can also order the books through CompuServe ($14.99 each, plus shipping and handling; prices subject to change). Typing GO TL calls up this marketing pitch: "Inside these silver-clad hardcover books, you'll begin at the dawn of computer technology . . . advance step-by-step through scientific breakthroughs . . . meet the masterminds who pioneered the silent revolution . . . and watch the brilliant careers of entrepreneurs who shaped the future of the computer industry."

Time-Life offers bonuses to subscribers, among them an eight-digit, full-function Comput-a-lator. What's a Comput-a-lator? A 3-by-3¼-inch calculator designed to look like a miniature personal computer.

We plan to take a closer look at the other volumes as they arrive; they sound fine for kids learning about the background of computers and how they work. But frankly, the series' silver-clad pages (*Omni*'s influence?), silver cardboard covers with pasted-on labels, and tacky illustrations are off-putting.

Understanding Computers has been selling well, but not as well as Time-Life's all-time best-seller, Home Repair and Improvement, or even number two, The Old West. In the book biz, how-to and romance are tough to beat, even in the Computerized Society.

The Computer Story, by Irving Fang (Rada Press, 1988), is where you'll find the intriguing photograph that appears on the lead page of this article. Fang got the picture from the University of Minnesota's Charles Babbage Institute, The Center for the History of Information Processing.

Apparently Ronald Reagan, then a spokesman for General Electric, found the GE 701 computer pictured here quite fascinating. Could our leader be puzzling out how to use the GE 701 to analyze future voter trends? Or is he merely saying, "Huh?"

Perhaps this photo opportunity marked the beginning of the computer-celebrity connection currently manifest in the IBM-*M*A*S*H* alliance. In this case it doesn't seem to have paid off: as *The Computer Story* points out, GE has since abandoned its computer-making business. ◪

Carol Olsen Day is a senior editor of PC/Computing.

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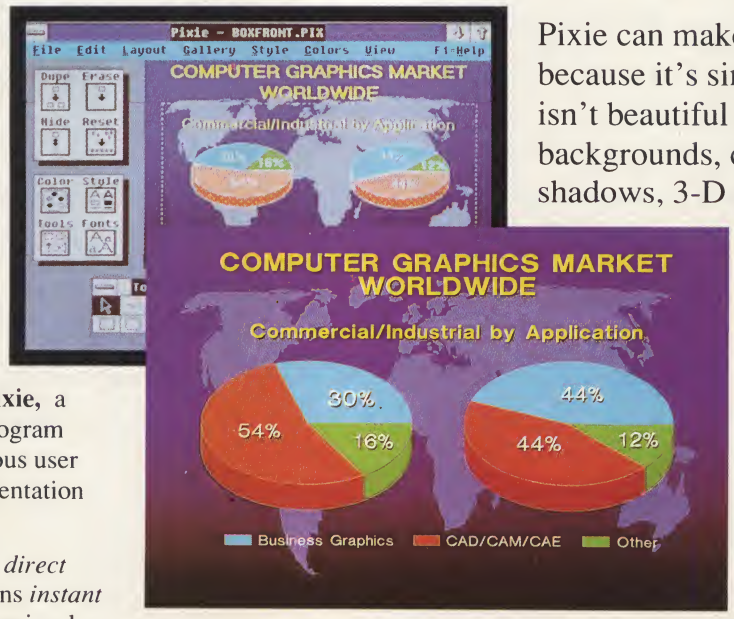

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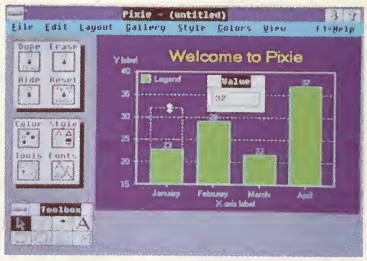
User interface technique	Direct manipulation	Fill-in forms	Fill-in forms
Editing preserved if chart changes?	Yes	No	No
Screen Fonts	Windows, Bitstream, Mirage	Helv, 1 hardware font	Stick
Maximum colors per image	16 million (Windows limit)	16	12
Compatible with professional systems?	Yes (Mirage)	No	No
Price	$195	$495	$495



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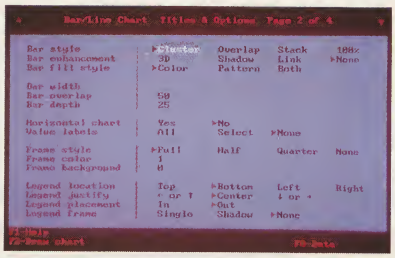

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IMPACT

By RANDY ROSS

Becca Anderson, a 14-year-old student from Blue Earth, Minnesota, was at a loss. She had to write a report comparing Chinese and American adolescents, and her research was coming up short. The problem? "I just couldn't find out what kids were wearing in China," she says.

So she logged onto her school library's PC. In the lower left-hand corner of a database citation on China, something piqued her interest—the name of a local expert. She interviewed the source, a recent visitor to the Asian mainland, and discovered the missing fact: Chinese teenagers wear blue jeans, just like their American counterparts. Becca, who received an A-minus on her paper, attributes some of her scholarly success to the library's PC-based system. "It saves lots of time and gives you better papers," she says.

Like Becca, librarians and library patrons around the country are turning to personal computers. In fact, the number of PCs in use at libraries has at least quadrupled in the past two years, according to Nancy Melin Nelson, editor of *Small Computers in Libraries.* The nation's largest library, the Library of Congress in Washington, D.C., with 23 million books and pamphlets, had fewer than 50 PCs in 1982. Today it has 1,100. This surge in PC use reflects efforts to cut costs and improve service, says James Godwin, chief of the library's Information Technology Center.

Still, small libraries, such as the one at Blue Earth-Frost-Winnebago High School, probably benefit most from PCs, which allow them to automate like the big boys at a fraction of the cost. With PCs, smaller institutions can automate cataloging and circulation and provide computerized searches, things they couldn't do five years ago.

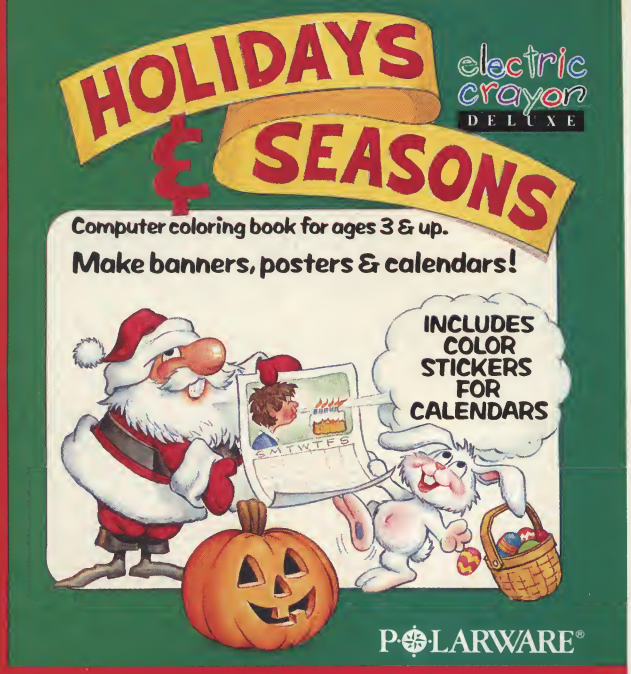
Although libraries have been computerized for 20 years, equipment with such capabilities has been reserved for large institutions with deep pockets that were able to purchase multimillion-dollar mainframe rigs. Priced out of the market, smaller libraries were left to their own devices, which generally meant card catalogs smudged with chocolate fingerprints. But as PCs became more popular and less expensive in the early 1980s, PC-based library workstations and software applications began to appear.

Probably the biggest boon to small libraries, says Nelson, is CD-ROM (compact disc/read-only memory) technology, which puts mainframe-sized databases in the hands of PC users. The first CD-ROM product for libraries, the BiblioFile cataloging system from the Library Corporation of Washington, D.C., was released in 1985. BiblioFile allows librarians to catalog books faster and more accurately, so that new books reach the shelves faster and are easier to find, says Karl Beiser, library systems coordinator for the Maine State Library.

Looking for mystery and adventure? CD-ROM systems and PCs help find them fast—in the library.

ILLUSTRATION BY JEAN CHRISTIAN KNAFF

Blue Earth's school system recently purchased CD-ROM drives for its elementary and high school libraries. Until the new drives are brought online, library functions at the high school are being performed on a system of three Apple IIe personal computers networked to a 45MB hard drive, plus circulation and cataloging software. The entire setup, in place since 1984, cost about $20,000. It uses a bar code reader to check books in and out and allows librarians to sort overdue slips by homeroom, according to David Sparks, media director for the Blue Earth schools. Still, the major advantage of the network is that it makes the student's life easier. Information about books, periodicals, and resource people in the community is stored on the hard drive and accessed with a key word or phrase. In fact, the high school's system is so user-friendly that a similar one at the



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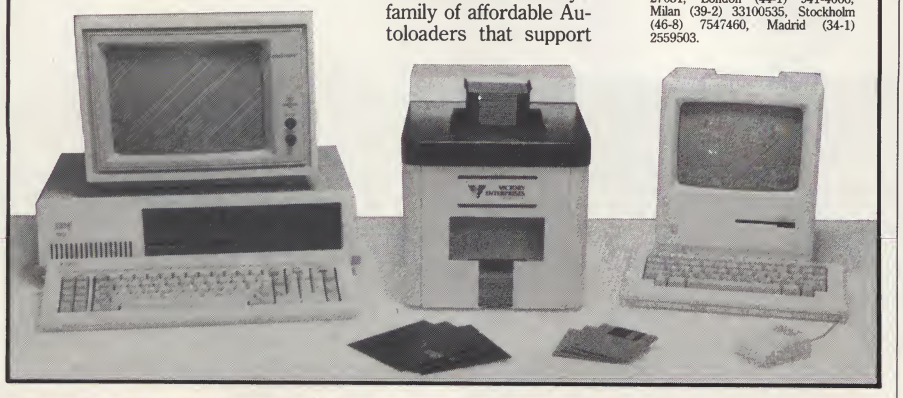

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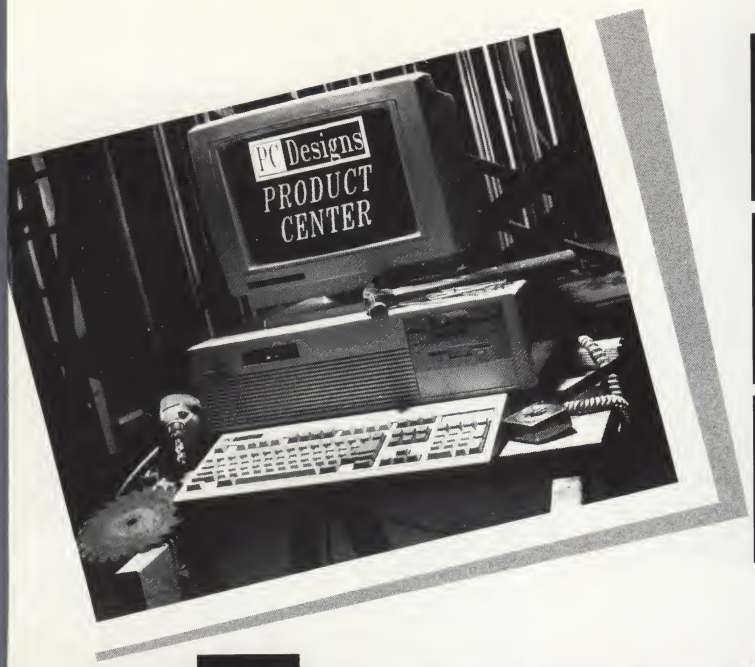
elementary school is used by the students there.

While PCs are bringing the power of computers to small libraries for the first time, in larger libraries they are being used with existing computer equipment to provide special research services and cut costs. For example, the University of Michigan Library in Ann Arbor allows faculty and graduate students to access the card catalog by modem, perform searches, and then order library materials to be delivered to their doorsteps, explains David McDonald, assistant director for systems. Undergraduates still must trek to the library, but they can save time by using the PCs there to download bibliographic information from any of its 23 branches located around the campus.

Though the university's library uses a $2.5 million mainframe-based system, it has been stepping up its PC purchases: in 1982 it bought 120 PCs, and in 1987 it acquired another 200. McDonald says that the PCs are more flexible than the university's dumb terminals—the PCs can tap into the mainframe for cataloging, circulation, and bibliographic search information. They can also perform routine office functions such as word processing and number crunching. PC-based CD-ROM stations for searching the contents of magazines and government documents are also in use.

PCs also cut search costs and give the public access to greater volumes of technical information. The Boston Public Library, which uses PCs as well as dumb terminals, has about 4 million books and pamphlets and performs about 2,700 custom searches each year, costing up to $1,100 apiece, according to George Cumming, science librarian. These searches are often performed using online databases that charge for connect time. A PC cuts connect time because the researcher can store information and print it later. A dumb terminal, on the other hand, has no memory and cannot print unless it's online; thus, custom searches done from the library's dumb terminals use more connect time and generally cost about one-third more than PC-based searches.

CD-ROM discs, with their vast storage capacity, may in many cases eliminate the need for connect time to large mainframes, while making the search process so simple that even a layman can do it. One result is that the public will have easier access to technical resources. A case in point, says Cum-



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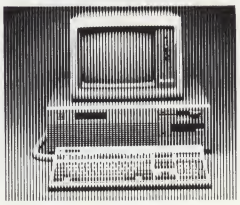

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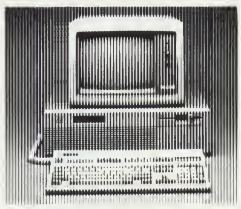

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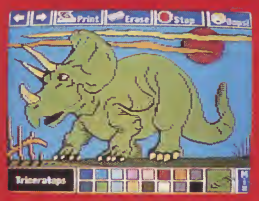

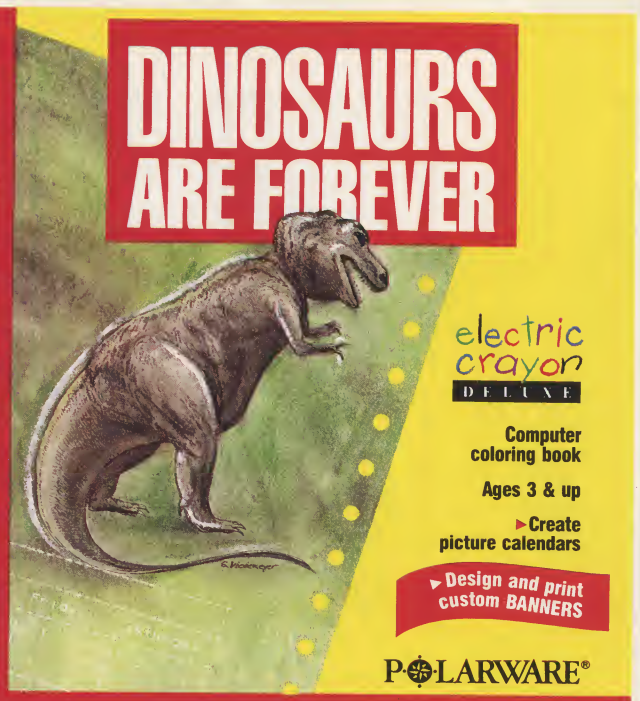

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ming, is that people diagnosed with diseases such as cancer can search a CD-ROM database to evaluate a physician's course of treatment. Previously, technical and medical indexes were printed in small type on densely packed pages. "If you spent more than ten minutes reading one, you felt like you were going blind," Cumming says. CD-ROM indexes are not only easier to read but also often include abstracts of the articles, so that locating the full text may be unnecessary.

In fact, CD-ROM technology is a major force that is bringing PCs into libraries. The Library of Congress is marketing some of its cataloging and filing protocols on CD-ROM discs, which will help legitimize the use of the technology in libraries. The Online Computer Library Center of Dublin, Ohio, a major vendor of online, mainframe-based products for libraries, recently introduced a line of CD-ROM-based bibliographies for a variety of topics, including agriculture, science, and technology.

The Library Corporation takes CD-ROMs a step further with a $2,770 PC-based system called the Intelligent Catalog, which has voice capabilities. It also uses a modified expert system to recommend fiction. Someone searching for a novel is asked to rate story themes, and the system suggests appropriate books and authors. For example, one reader looking for mystery, sex, and adventure received a reading list that included *The Great Gatsby* and *Madame Bovary*.

By penetrating the library's fiction section, the PC may have dealt the final blow to the card catalog, whose nonfiction entries have been fading from lack of use. The Library of Congress hasn't added to its card catalog since the early 1980s, and now many smaller institutions are following suit: Becca Anderson says she hasn't used a card catalog since sixth grade. In fact, the library of the future may contain very few books, as full-text CD-ROM materials become common. Blue Earth's David Sparks has already ordered a full-text electronic encyclopedia and other references.

What does all this mean to library users? It's a little hard to answer such a question in the abstract. But for Becca, the answer is simple: it means her next A may come a little easier. ◧

Randy Ross is an associate editor of PC/Computing.

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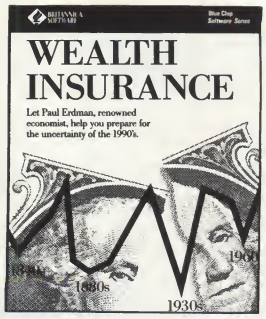

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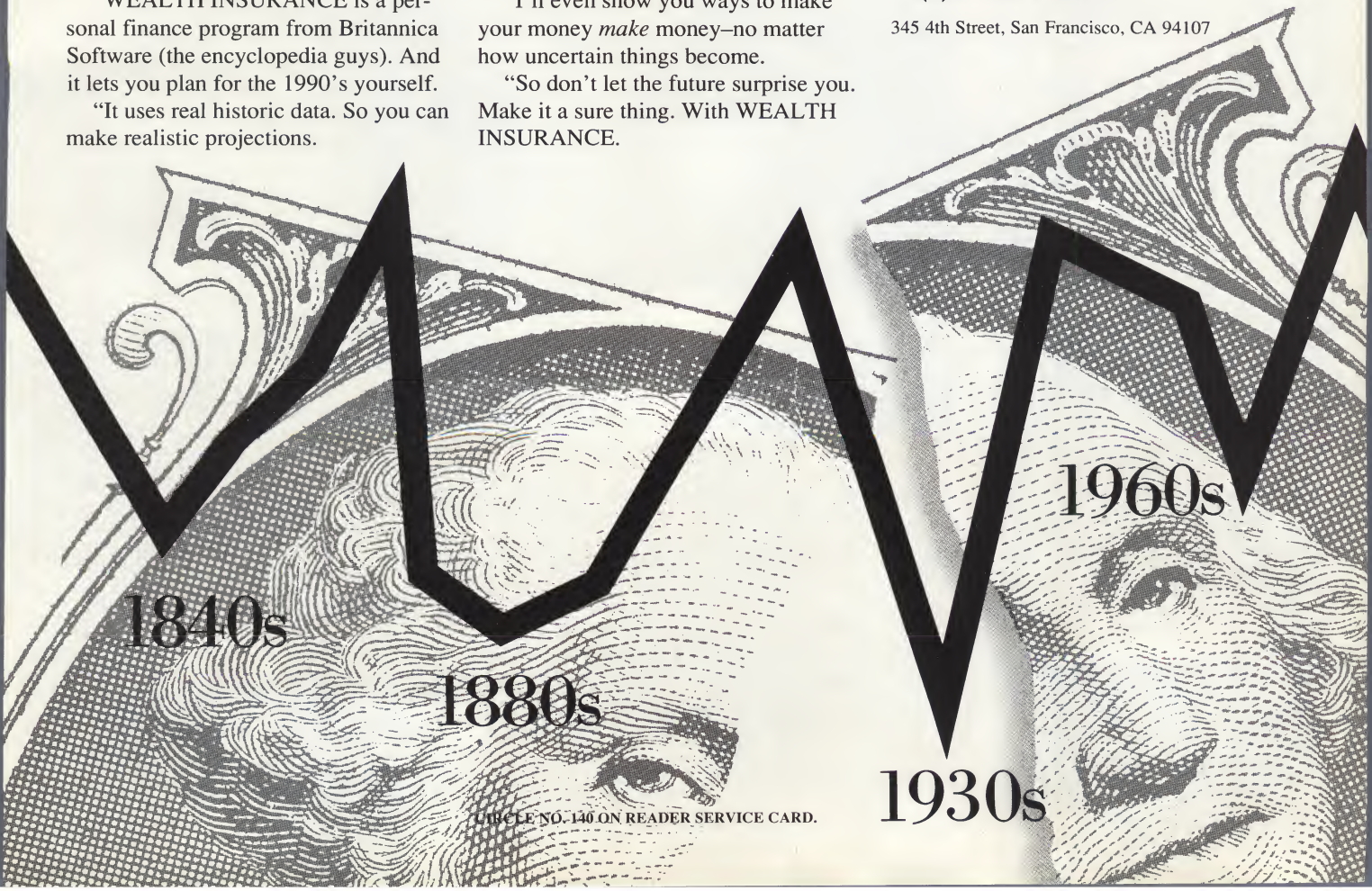

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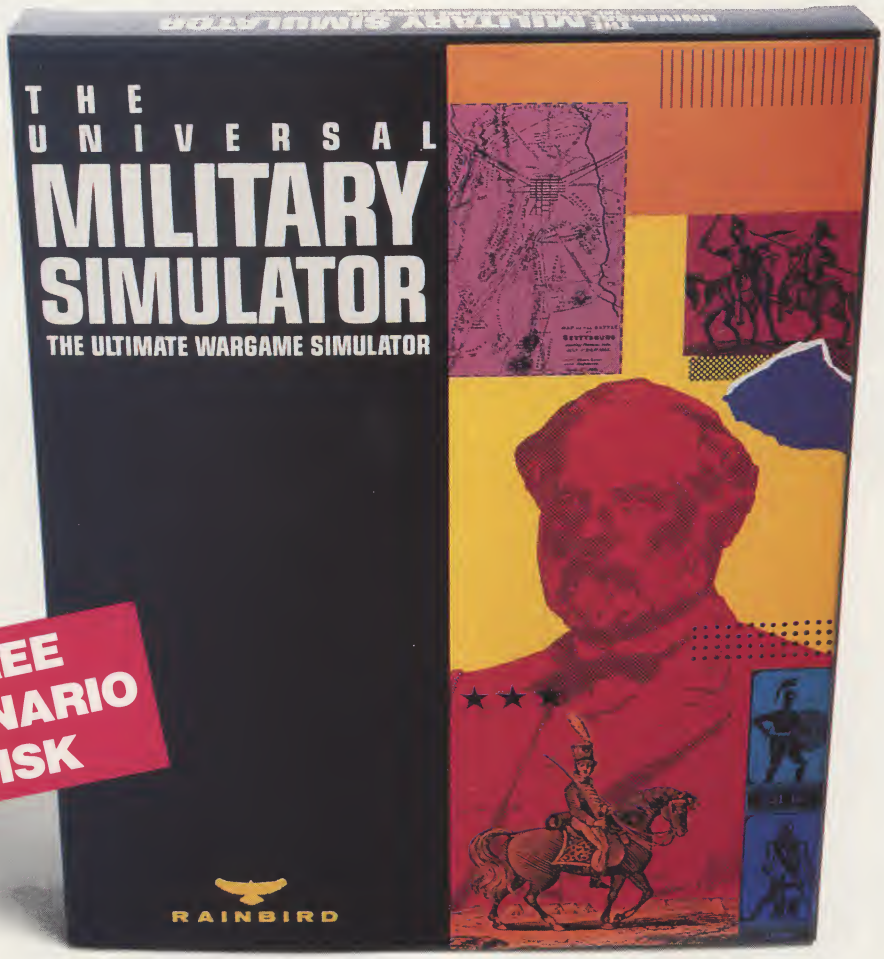

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CIRCLE NO. 273 ON READER SERVICE CARD.

KIDS

Edited by HERB BRODY

Judging from your letters, we can tell that a lot of you think computers will somehow make you smarter—at least, that's what you're telling your parents so that they'll give you one.

But remember: computers are just tools. Sure, a word processor makes it easier to write a paper for class. But the really hard part—and the really important part, too—is coming up with the words to write. No matter how great-looking you can make your papers, they will (we hope) be judged more for their creativity, accuracy, and content.

We'd really like to see more good writing from you kids, so show us your stuff. Whether it's stories, poems, reviews of games you're playing, or tips for other kids on doing things with computers, we're eager to see what you can do.

Tegan C. Raleigh has the run of her mother's Apple computers: a Macintosh Plus and a IIGS. Mainly she plays games, such as Jam Session, Where in Europe Is Carmen Sandiego?, and a shareware program called Bounce-It. But she's doing real work with the computers, too:

I like to write poetry and scripts on the Macintosh Plus for my friends and family. With most programs, I can include a picture along with my writing. I usually use the Macintosh Plus for drawing at home, since the programs for it are faster than those on the IIGS. Although I don't have a Macintosh II, I like that machine better for drawing, because it has color.

Probably my most productive and interesting project on the computer is my school newspaper. I used my mom's Macintosh Plus for the writing and the Apple IIGS for the graphics. In the newspaper I had a front page, an entertainment/sports page, a weather/politics page, and a fun page. The newspaper lasted for only six weeks, since it was for a class I was taking.

Of all the machines I have used, I like the Macintosh II the best. Too bad my friend has one and I don't!

Tegan C. Raleigh, 11
380 Auburn Way, Apt. 14
San Jose, Calif. 95129

Kevin Page is a sixth-grade entrepreneur. When neighbors go away on vacation, he watches after their houses, feeds their pets, and waters their plants. He got started in business by producing a promotional flyer on his family's Macintosh SE. Kevin advertises himself as reliable, trustworthy—and cheap. How can he fail?

I just wanted to tell you what us kids out here use our computers for. We don't just play games!

I designed a flyer to pass around to my neighbors. I used graphics from HyperCard and text from Microsoft Word. Within two hours after I passed them out I got a job! It felt good to do this on my own.

Our computer will help with school reports all the way through college. It will also, hopefully, earn me $25 from *PC/Computing!*

Kevin Page, 11
19514 Chadway St.
Canyon Country, Calif.
91351

Sean Jones's parents use computers, but he wants them to do better. Sean frets about how to turn them from timid beginners into power users—like himself. Maybe you can send him some advice, through the Kids department:

My parents are pretty smart, but they need help. On our PC's hard disk we have WordPerfect, Lotus 1-2-3, and a database, but not all of them get used as much as they should. My dad's great at the word processor, but he doesn't know how to use the spreadsheet that well. I find it easy to manage the accounting for my paper route on Lotus.

Years ago, my mom started using Bank Street Writer to help her write letters, but she hasn't moved on to any more powerful programs. She wouldn't even dream of using a database for organizing her addresses.

I often wonder how I should educate my parents. I realize it's important, but I don't know how.

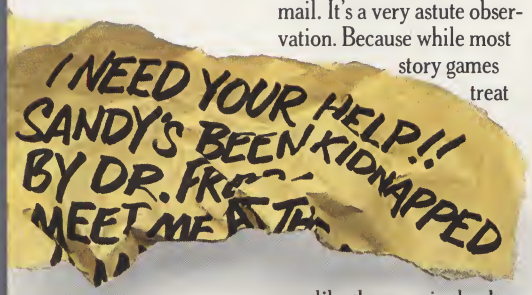
Sean Jones, 12
7759 South Ivy Way
Englewood, Colo. 80112

Kids . . . this is your page in *PC/Computing*. Not just *for* you, but also *by* you. Send your submissions to Kids Department, *PC/Computing* Magazine, 80 Blanchard Rd., Burlington, Mass. 01803. If we publish your letter or article, we'll send you a check for $25—so make sure you include your complete home address and your telephone number.

NEW HOPE FOR BATTERED STORY GAMERS.

"THERE'S A LOT I LIKE about computer adventures, but it sure isn't fun getting killed all the time. That's why *Maniac Mansion* is so refreshing — I can play from start to finish without dying once!"

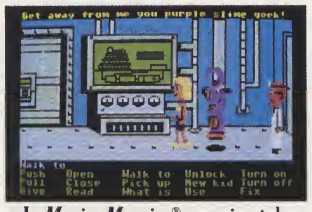
That's more than great fan mail. It's a very astute observation. Because while most story games treat you like the meat in the dog food factory, Lucasfilm story games treat you like a human being who just wants some good clean fun.



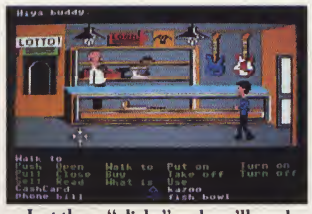
The fun starts with an engaging plot, hot graphics and tasty puzzles. But what keeps it going is a unique design that lets you play the game instead of fighting the computer.

THE NO-TYPING INTERFACE.

Today's story games evolved from text adventures. The interface, in most cases, remained in the swamp.



In *Maniac Mansion*,® a movie-style "cut-scene" quickly establishes the characters' personalities.



Just three "clicks," and you'll send *Zak McKracken*™ over to the pawn shop counter to buy a pair of nose glasses.

With conventional story games, whenever you want your character to do something, you type. And type. And type.

Suppose you want to pick up a green leafy object. Well, you might try typing, "pick up plant." If that doesn't work, you might try "bush," "shrub," "tree," and so on. After a while, you might try a different form of entertainment.

Not with Lucasfilm's new "point 'n' click" interface, though. All the words you need are right on the screen. Just click the cursor on them to choose characters, objects, and actions.

Now you can play an entire fifty hour game without typing a single word. Or putting your life on hold until you realize the green leafy thing is a...plastic fern.

MORE STORY. LESS GORY.

Most story game designers seem to think people love to get clobbered.

We don't. After all, how much fun can it be to have a fatal accident every three and a half minutes... then reload your saved game, take a few timid steps forward, and save it again. Seems more like paranoia than entertainment.

That's why Lucasfilm story games make it downright difficult to die. Oh, you'll get into major hot water all right, but you'll have the fun of getting out of it, too.

LET'S GET CRAZY TOGETHER.

Just pick up a copy of *Maniac Mansion*,® the comedy thriller about a kidnapped cheerleader, a very mad scientist, and a hilariously creepy rescue mission.

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You'll love the twisty plots and the goofy characters. You'll crack up constantly with the zany one-liners and sight gags. And you'll go just a little crazy with the mind-bending puzzles.

Crazy, but nicely crazy.

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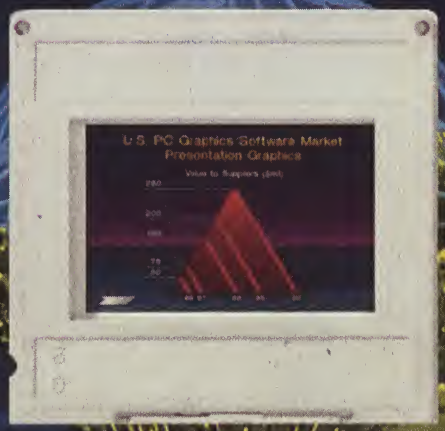

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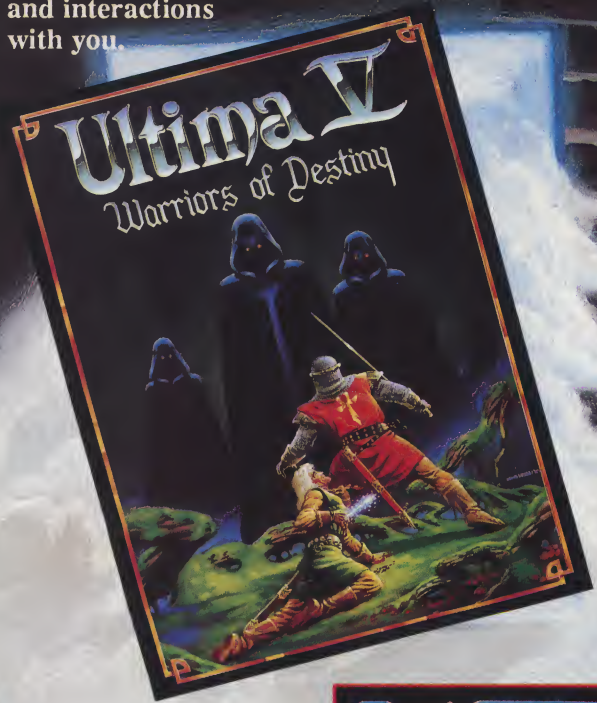

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CIRCLE NO. 208 ON READER SERVICE CARD.

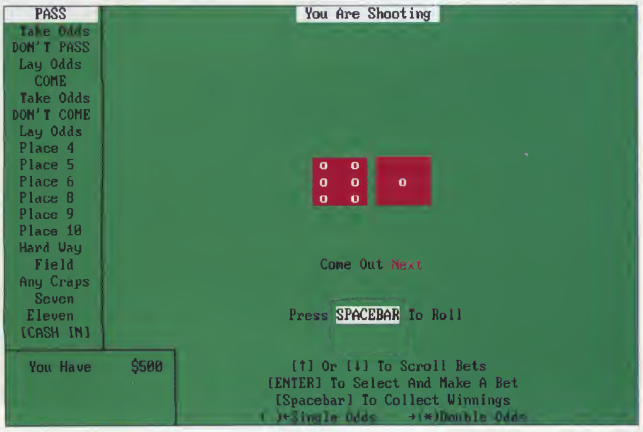
FUN!

By CHRIS SHIPLEY

Ah, Las Vegas. The lights, the neon, the glitter. Showgirls and slot machines. The roll of the dice, the snap of the shuffle, the clink of the chips. Fortunes won, fortunes lost.

Vegas is a sensual thing, an experience as much as a place. And it doesn't lend itself to electronic replication.

But it's also a numbers town, and that's something computers know about. So the folks at Manhattan Software have cut through the glitz to show you the house rules, the odds, the strategies, the bets. They offer five learn-as-you-play casino games—Casino Blackjack, Las Vegas Hold'em, Casino Craps, Casino Betting Systems, and Seven Card Stud—and throw in Gin Rummy and Cribbage Master II for the less daring. The games aren't pretty—the graphics are simplistic, the packaging dull—but learning them is as much fun as winning them.

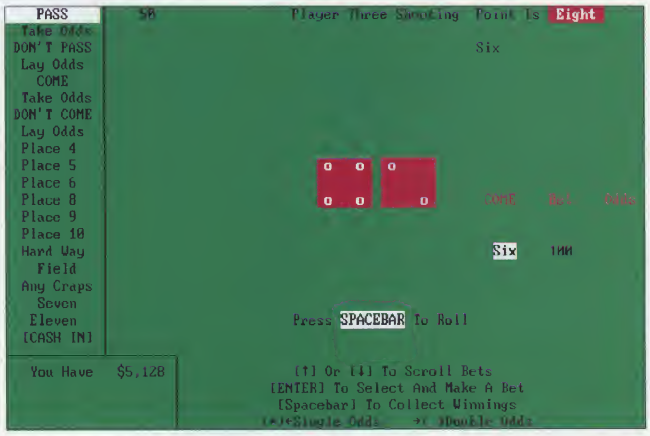


Like the actual game, Casino Craps lets you bet between rolls as dice pass between players.

Casino Craps

Craps is a paradox. The game is simple, but the betting—at least to the novice gambler—is astonishingly complex. Place your bet, roll the dice, bet some more, roll the dice again. Win chips, lose chips. It all happens so fast that if you don't understand the peculiar betting strategies you can lose your shirt. Casino Craps gives you a sense of those bets (19 kinds in all) and sets you on your way to becoming an ace shooter.

Choose a $10, $5, or $1 table and name your stakes. You can start with 100 times the table minimum in chips (the "normal" stake). High stakes multiplies the minimum by 250. The manual advises discretion, of course, but it's hard to resist the temptation to throw some big money around. Manual be damned, I chose the $10 table and high stakes.



Casino Craps' on-screen image displays betting options, dice, and status prompts.

To call Casino Craps' on-screen image a *table* is a misnomer. Manhattan Software doesn't replicate a Vegas craps table. Instead, you're faced with a list of betting options, the dice, and status prompts for bets. It's not thrilling, but it allows you to concentrate on the game—which is, after all, the intent of the package.

What Casino Craps lacks on the screen, it tries to make up for in text. The manual describes a typical felt-covered craps table, the players and the house crew (the Stickman, two Dealers, and a "flinty-eyed Boxman . . . watching and supervising"), and the passing of the dice. A healthy imagination and a recollection of "Vega$" reruns almost puts you there.

The Casino Craps manual advises discretion. Manual be damned, I chose the $10 table and high stakes.

In fact, the descriptions, instructions, and advice in the Casino Craps documentation are more provocative than the game itself. The manual discusses rules, terminology, odds, and sensible bets ("The major reason the house gets rich . . . is that a great many craps players are, simply, boobs."). It describes the six basic bets that will keep you close to, if not in,

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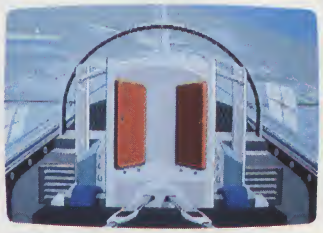

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the black, and warns of the "sucker" bets that will ultimately send you packing, empty-handed.

Once you get through the manual, run the software to test what you've learned. You're the opening shooter, so you must bet accordingly. If you try to place an invalid bet, like a "Come" bet on the opening (or "Come Out") roll, the software chides you with a beep and won't accept the wager. (I shudder, imagining the scowl of the flinty-eyed Boxman.) The on-screen game proceeds as it would at an actual table: you can bet between rolls, and the dice pass from electronic player to player, giving you the sense of betting on another shooter.

There are probably as many methods for learning craps as there are rolls of the dice, but Manhattan's worked for me. In 15 minutes I racked up $2,864 in a high-stakes game. Which brings me to the only drawback of electronic casino games: when you cash in your chips, you get only a DOS prompt in return.

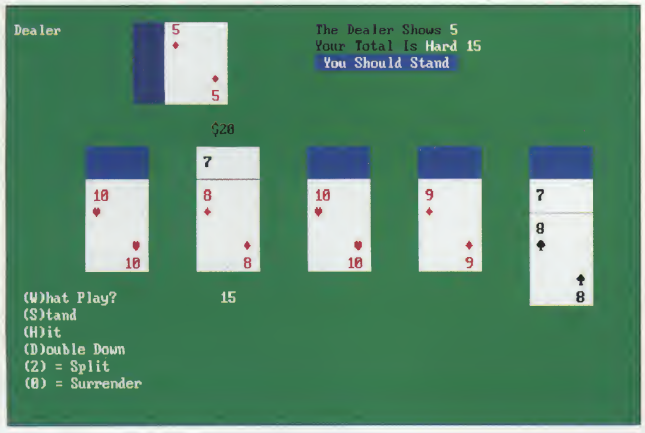
Casino Blackjack Counter/Tutor

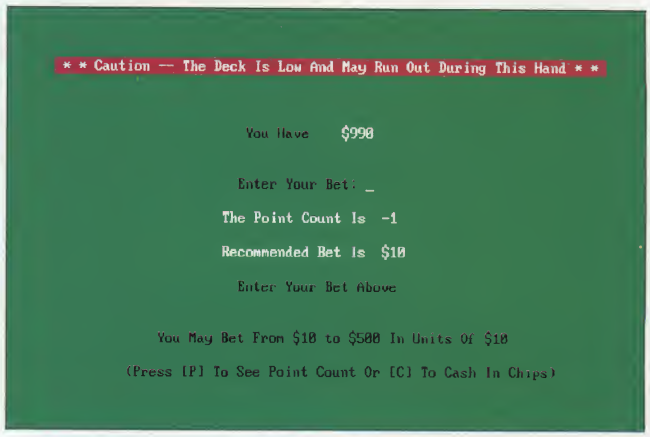
Most of us learn blackjack soon after we shuffle our first deck of cards. It's a simple game with straightforward betting. It's so easy, in fact, that you can lose a lot of money very quickly when you sit down at a fast-dealing Vegas table. Just keep turning the cards and hope you beat the dealer. It's all luck. Or is it?

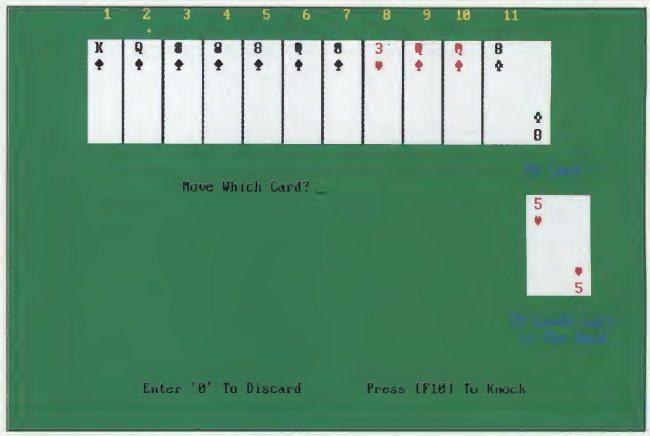
Casino Blackjack's point-counting strategy gives players a slight edge over the house.

Manhattan Software's Casino Blackjack Counter/Tutor tries to take some of the chance out of the game by introducing you to "point counting," a strategy of blackjack that gives players a slight statistical advantage over the house. The system gives each card a point value. The 2, 3, 4, 5, and 6 cards are worth one point each; the 7, 8, and 9 cards are worth zero each; and the 10, jack, queen, king, and ace are worth negative one point each. By keeping a tally of the cumulative point total as the cards are dealt, you can—presumably—place a safer bet. For example, if the card sequence is ace, 9, 5, 10, king, 8, the running point tally is -1, -1, 0, -1, -2, -2. If the total is zero or less, bet the table's minimum, the tutor advises. If the total is a positive number, multiply that minimum bet times the tally to get a practical betting limit.

Not sure if you should stand or take a hit? A menu option solicits advice.







Gin Rummy 4.0 was really the most fun, partly because I already knew the game, and partly because of its pace.

As with Casino Craps, the strength of Casino Blackjack is its manual. It explains the point system, recommends bets and plays, and covers the basic ins and outs of the game. Advice is easy to get onscreen, too. Not sure if you should stand or take a hit? A menu option solicits the program's advice.

You can test the program's prescribed system by playing as the fourth player among five or the last of four players, or you can go head-to-head with the dealer. The program gives you $1,000—a pot you can (if you play as I did) lose in increments of $10 bets. If you forget the point count, hit the P key for the current count and recommended bet.

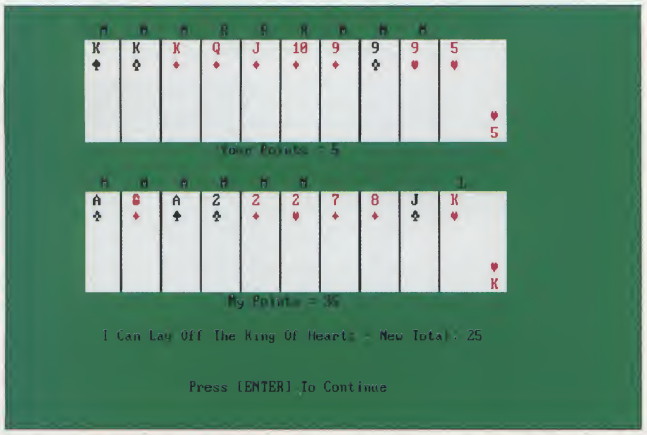
The problem with Casino Blackjack is that it turns the game I learned as a kid into a science. That's fine if you're headed to a casino and want to gamble using a wiser strategy, but you can end up paying so much attention to the numbers that you stop enjoying the game's element of chance.

And if you toss the point system aside to play Casino Blackjack just for fun, there's really not much fun to it. The cards are dealt so quickly, even at the lowest speed setting, that you don't feel the drama in the slow turn of the top card: is it the jackpot or bust?

Gin Rummy 4.0

If you prefer a quiet game of cards to the chatter of dealers and the ding of slot machines, then Gin Rummy 4.0

FUN!



is the game for you.

Of the Manhattan games I played, Gin Rummy really was the most fun, partly because I already knew the game, and partly because of its pace. If you play computer games to take a break from the pressures of the workaday world, Gin Rummy 4.0 is a good one.

Your computer-based opponent deals the first round. Arrange your hand by moving cards from one numbered position to another; discard the same way. Be careful not to confuse card position with the face value of a card. I discarded a 7 of spades in the 3-spot, instead of a 3 of hearts in the 11-spot, thus breaking a run of five cards. My luck, the computer "knocked" on the next turn.

All the rules of gin apply. The hand ends when either you or the PC knocks or the cards run out.

All the standard rules of gin apply. Draw from the deck or take the up-facing card, arrange your hand, and discard. The hand continues until either you or the PC knocks or the cards run out. The PC prompts you through scoring, counting off your runs and melds, and laying off your opponent's hand. But don't try to cheat the machine; it simply won't let you, and its glaring error messages can be a little disconcerting.

Playing cards against a PC gives new meaning to the term *poker face*. No smile, no twinkle in the eye, no patient tapping of fingers on cards. And no cards are passed under the table, of course. Gin Rummy 4.0 is probably about as good as a computerized card game can get. It's simple, it's relaxing, and it's even a little fun. ◪

Chris Shipley is a senior editor of PC/Computing.

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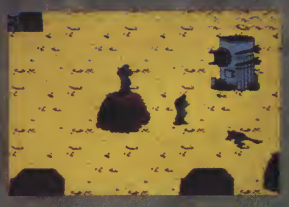

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HELP!

Edited by JEFF PROSISE

There is much talk in the press about computer viruses that can damage or destroy information stored on a hard disk. How bad is the problem, and what precautions should I take so that my computer doesn't become infected?

Rod Taylor
Oak Ridge, Tennessee

A computer virus is a program written to spread from computer to computer, just as a human virus spreads among people. Once it has infected a machine, a virus copies itself onto diskettes it comes into contact with and, in turn, infects other systems the diskettes are used in. A virus may be written to play a harmless joke, such as printing a message on your screen on a certain date, but it can also be made to wipe out a hard disk. For obvious reasons, you want to avoid viruses if you can.

How bad the problem is depends on whom you're talking to. There have been a number confirmed reports of virus attacks, and many more unconfirmed instances where a virus was blamed for what was probably user error. But viruses definitely exist, and they can pose a hazard for your data.

There are two ways to sharply reduce the chance that a virus will infect your computer. First, don't run programs you're not reasonably familiar with, especially those downloaded from public bulletin boards. Second, install a vaccine program designed to keep a virus from infecting your hard disk or, if one slips by, to recognize it and warn you before it's too late. Several such antivirus programs are available. They vary in effectiveness, however, and none can claim to be foolproof.

Four of the better-known antivirus utilities are Flu-Shot Plus, a shareware program from Ross Greenberg, Software Concepts Design, New York, New York; Vaccine, from FoundationWare, Cleveland, Ohio; Mace Vaccine, from Paul Mace Software, Ashland, Oregon; and Vaccine, published by WorldWide Data, New York. If you frequently transfer data by diskette, consider using one of these programs for an extra measure of protection.

I once knew how to enter upper-order ASCII characters from the keyboard using the numeric keypad but have forgotten exactly how I did it. Can you refresh my memory?

David P. Morach
North Billerica, Massachusetts

Once you know a character's ASCII code, you can type it in by pressing and holding down your computer's Alt key, entering the decimal ASCII code on the numeric keypad, and releasing the Alt key. The character will appear when you release Alt. (This may not work on some portables.)

There are 256 ASCII characters, only 60 or so of which are normally accessible from the keyboard. The characters you normally don't see include mathematical symbols, Greek letters, graphics characters, and more. Once you have access to them all, you can dress up documents as never before.

The character whose ASCII value is 196, for example, is a horizontal line that extends from one end of its character cell to the other. Unlike the hyphen, it can be used to draw a continuous, unbroken line. To enter it, press and hold the Alt key, go to the numeric keypad and type 196, and release Alt. Repeat this several times to build a horizontal line. You must use the number keys on the keypad, not the numeric keys along the top row of the keyboard.

You can experiment with this technique inside your favorite word processor or even on the DOS command line. Since it's built right into your computer's keyboard BIOS, it will work with many software packages. Not all output devices, however, can print all the extended characters.

If you don't have a chart of the ASCII character set, go down to your local computer bookstore and look for books on DOS. Almost any one of them will contain an ASCII table. IBM's BASICA manual also has one.

What's the difference between a TSR program and a conventional program, and what does TSR stand for?

Edna Wilberton
Eugene, Oregon

TSR stands for *terminate and stay resident*, and it's the name DOS gives a program that isn't removed from memory when you stop running it. DOS is a single-tasking operating system that will run only one program at a time. With the TSR mechanism, several programs can be resident in memory simultaneously. Control can be shifted around between them to give the appearance of multitasking.

When a normal program (called a transient program by the authors of DOS) ends, the memory it used is released and can be allocated to the next program loaded and run. When a TSR terminates, on the other hand, it doesn't release all its memory. This area of memory—and the program in it—will remain intact because DOS won't overwrite it when another program is run.

This allows the TSR to sit unobtrusively in the background, waiting for you to give it a signal to pop up. When the right keys are pressed, the TSR temporarily suspends whatever program is running at the time and comes onto your screen. When its work is

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HELP!

done, it returns the computer to the program it interrupted at the exact place it left off.

There are hundreds of TSRs. One of the most popular (and the program credited with starting the TSR explosion) is Borland's SideKick, which gives you a pop-up calculator, notepad, phone list, and other desktop tools. The real value of such a utility is that you don't have to quit the application you're running to use it.

I own an 80286 machine with 640KB of memory, part of which I dedicate to several TSR programs that are loaded every time I boot up. If I added extended memory, could I use it to maintain the TSRs and preserve the original 640KB for all my other programs?

Leonard J. Silver
Bethel Park, Pennsylvania

The answer, in all but a few cases, is no. A TSR can't be stuffed into extended memory unless it was written with that capability in mind.

A few commercial TSRs can install themselves into extended or expanded memory. These programs typically take up just enough conventional memory to allow them to monitor the keyboard (maybe 1KB or so) and store everything else in expanded or extended memory.

What does the Fastopen command do, and why can't I find any documentation on it in my DOS 3.2 manual?

J.M. Rhodes
Medfield, Massachusetts

Fastopen speeds searches for program files in hard disk directories designated with the Path command. It does this by remembering which directories and files have been accessed most recently. You don't find reference to it in your DOS manual because Fastopen was introduced with DOS 3.3.

When you type a command at the DOS prompt, DOS checks for a program file of the same name in the current directory. If it doesn't find the program there, DOS begins searching the list of directories you spelled out with the Path command. If the path contains several directories, DOS might take a few seconds to locate the right file.

Fastopen is a TSR that maintains a record of the directories and files accessed most recently. DOS can speed its searches by checking the Fastopen list before the Path list.

By default, Fastopen limits its list to 34 entries. You can specify a different number when Fastopen is invoked from the DOS command line or from an Autoexec.bat file. The following command loads Fastopen, tells it to work with drive C:, and expands the number of Fastopen entries to 75:

```
FASTOPEN C:=75
```

Up to four drives can be included in the Fastopen list, and 10 to 999 entries can be designated for each drive.

Fastopen can be loaded only once. Don't use it with a drive targeted by a Subst, Join, or Assign command. It can't be used with floppy disks. And remember that a longer list of entries can slow the process down. The default of 34 is sufficient for most applications.

I am thinking of upgrading to a new system that has a 1.44MB 3½-inch diskette drive and a 40MB hard drive. One problem: I have a storehouse of data on 360KB 5¼-inch diskettes that I need to keep. How can I transfer what's on the 5¼-inch diskettes to 3½-inch media?

Charles Reuter
Mount Joy, Pennsylvania

In either of two ways: by adding a 5¼-inch drive to your new system, or by connecting your old machine to your new one via null modem cable and transferring the data by wire.

Internal and external 5¼-inch drives are available from a variety of sources. Whether or not your system will accommodate an internal drive depends on its physical dimensions. With a 3½-inch drive configured as drive A: and a 5¼-inch model installed as B:, transferring files between the two is no different from transferring files between a pair of 5¼-inch drives.

The null modem cable solution may be the most economical if you plan to convert all your data to 3½-inch media and never use a 5¼-inch diskette again. Transferring data in this fashion does add the inconvenience of having to

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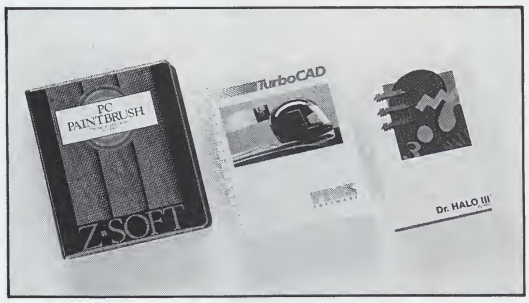

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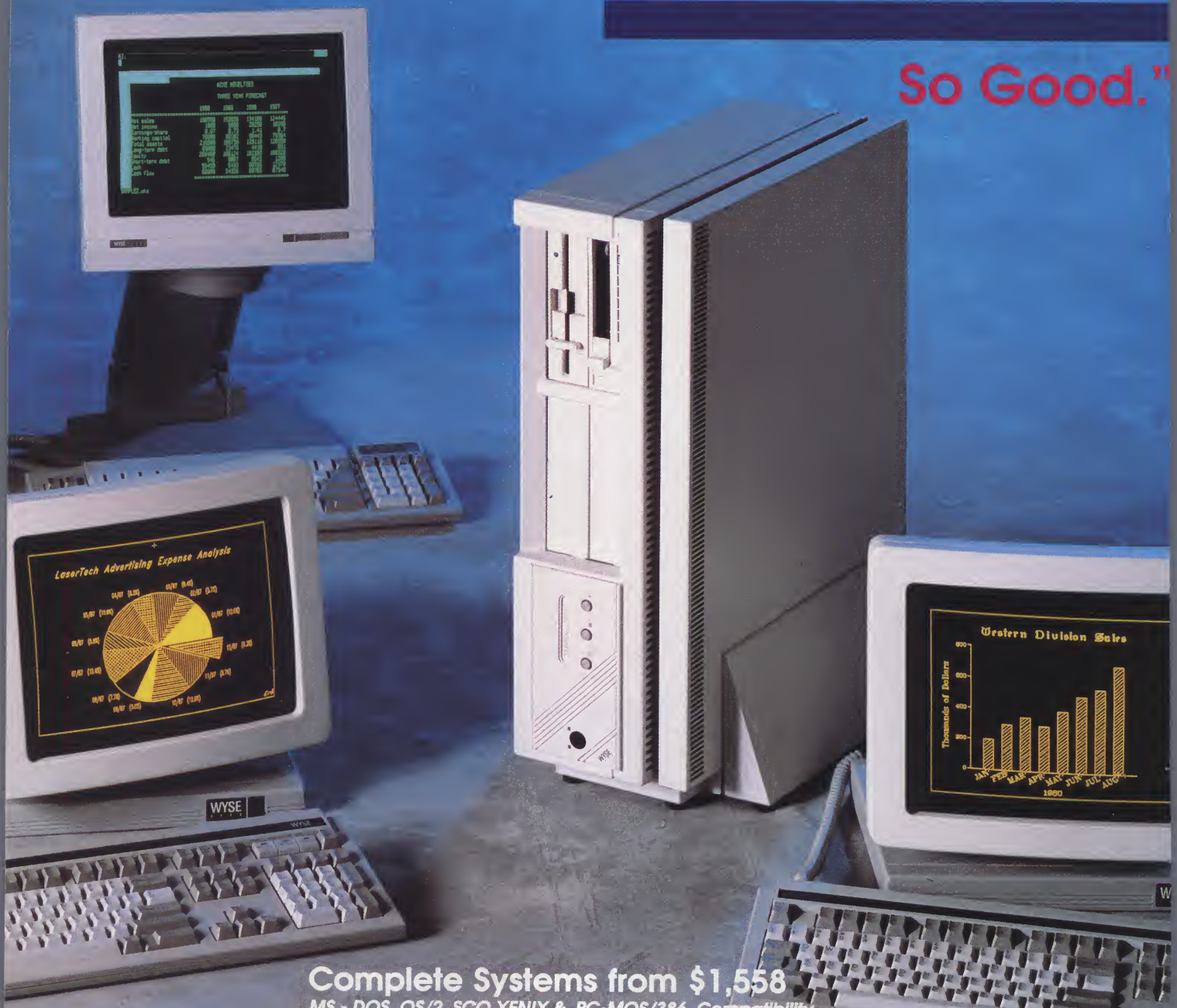

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HELP!

place the two computers side by side for a short time. It also requires specialized software.

My favorite program for data transfer is LapLink, from Traveling Software of Bothell, Washington. LapLink makes sending files from one computer to another a simple operation. The LapLink package includes everything you need: program diskettes (in both 5¼- and 3½-inch format) and the cable necessary to link two machines with 9- or 25-pin serial port connectors. Best of all, the software lets you experiment with transfer rates to find the highest one your hardware can handle, and it is so easy to use that you can be up and running in a matter of minutes.

Is it possible to add a 3½-inch diskette drive to my AT compatible, which is now configured with two 5¼-inch drives and a hard disk?

Harry P. Matosian
Sherman Oaks, California

You can replace one of your 5¼-inch drives with any of several internal or external 3½-inch drives on the market. One precaution: you'll need to use DOS 3.2 or later with your newly installed drive, because earlier versions do not support 3½-inch media.

I own an AT&T 6300 computer powered by an 8086 microprocessor running at 10MHz. What is the difference between the 8086 and the newer chips I read so much about, the 80286 and 80386? Could I get better performance by upgrading to a machine with one of these chips?

George Menzie
Medford, Oregon

The Intel 8086 microprocessor is almost identical to the 8088 chip that powers the original IBM PCs. The 80286 and 80386 are more advanced versions of the 8086 that offer a number of additional features, including higher performance, the ability to address more than 1MB of memory, and hardware-supported multitasking.

The 80286 and 80386 run faster than the 8086 for a couple of reasons. First, 8086-based machines typically run at clock speeds from 4.77MHz up to about 10MHz. The 80286 can run at clock speeds ranging from 6MHz to 16MHz. The 80386 is capable of higher speeds still, from a base of 16MHz up to 25MHz. Production versions of an even faster 80386, able to run at 33MHz, should be available soon. With a higher clock speed, more work gets done in the same amount of time.

Second, chip designers optimized the 80286 and 80386 to execute 8086 instructions in fewer clock cycles. An instruction that takes 15 clock cycles on an 8086, for example, takes only five clock cycles on an 80286 and four on an 80386. In more extreme cases, an operation that takes over 150 clock cycles on an 8086 takes only 25 on its successors.

The 80386 gains an additional measure of speed by processing data 32 bits at a time. The 8086 is limited to handling data in 16-bit chunks.

The net result is that 80286 computers typically run two to three times as fast as comparably equipped 8086 models, and 80386 machines run about twice as fast as 80286 machines. Your 10MHz 8086 might be roughly equivalent to a 6-to-8MHz 80286. To realize an increase in performance, you would need either a fast 80286 or an 80386.

What are Autoexec.bat and Config.sys files? My computer doesn't have either but runs fine without them.

Jayne Greenstein
Cambridge, Massachusetts

DOS checks for two special files in the boot disk's root directory during initialization: Autoexec.bat and Config.sys. Both are plain text files that contain commands to the system. The Autoexec.bat file is simply a list of normal DOS commands you want automatically executed every time your computer is started. Config.sys is used to modify internal parameters of the operating system, such as the number of disk buffers, and to load device drivers.

Your computer doesn't require either file to run properly; both are included for convenience. A typical use of Autoexec.bat is to install any terminate-and-stay-resident programs (TSRs) you want loaded and to execute a Path command if you have a hard disk. Autoexec.bat is no different

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HELP!

from any other batch file, and the results you get from running it are no different from what you would get by typing in the commands on the command line.

Config.sys can contain only a relatively small set of subcommands unique to the file itself. One of the most important is the Device command. Device lets you load a device driver—a special type of program that latches onto DOS in a manner similar to a TSR and works in the background. DOS comes with a handful of device drivers, including Vdisk.sys, which allows you to set up a RAMdisk that behaves just like a real disk drive.

I own a PC compatible for which I purchased and installed a battery-operated clock/calendar card. Although I'm asked to enter the date and time every time I boot up, the machine forgets them as soon as it's powered back down. Is there any way to get the date and time to stick?

Rudolph Bigda
Holyoke, Massachusetts

Yes. Your clock/calendar card should have come with a utility program to set the time and date in its CMOS RAM. In addition, it should have included a second utility that reads the date and time from the card and sets the DOS date and time to be the same. Placing the latter program in your Autoexec.bat file will ensure that the DOS date and time are automatically initialized at startup.

If you're using an IBM PC AT and any version of DOS earlier than 3.3, DOS reads the date and time from the AT's onboard clock/calendar at startup but requires the separate Setup utility to set it. In DOS 3.3 and later, the Date and Time commands set the onboard clock/calendar as well as the DOS date and time.

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NEXT

By PHILLIP ROBINSON

ILLUSTRATION BY MERLE NACHT

What's next for Apple Computer? That's a question that Apple has to answer soon if it wants to stay at the forefront of the personal computing market.

Apple survived early competition from Commodore and Tandy, lived through two failed computers (the Apple III and the Lisa), went head-to-head with the IBM PC in the business market and lost badly for several years, then climbed back into the spotlight with the Macintosh and its graphical user interface.

The Macintosh gets a lot of respect these days. With desktop publishing as the Trojan horse that gets it through the gates of corporate offices, the Mac has wooed American business with programs like Excel, PageMaker, and Word and a slew of graphics software. Still, it hasn't won out over the PC.

People buy Macs because the interface makes them so darned easy to use. The Mac interface of dialog boxes, icons for files and programs, and pull-down menus is far more standard and universal than what you find in PC software. Mac applications have an easier time swapping information, driving printers, handling new display monitors, and talking to you—the user. And because the Mac operating system can handle multiple megabytes of memory much more easily than DOS can, you can run a couple of programs at once. What's more, if you use Apple's MultiFinder software, you have some degree of multitasking.

But you can buy a lot more computer horsepower in a DOS machine for the same amount of money. A 386-based clone can be had for about two thousand bucks, if you avoid the big-name brands. A comparable Mac II can cost twice as much.

And the Big Blue world is catching up with the graphical interface, too. IBM's Presentation Manager software, and the OS/2 operating system it will ride on, will bring multitasking, multiple megabytes of memory, and a simple interface to the latest PC compatibles and PS/2 computers.

Graphics Galore

Microsoft Windows and Hewlett-Packard's NewWave do a pretty good job of bringing the look and feel of the Mac to the DOS world. The entire microcomputer industry seems to be headed toward a graphical user interface. Even powerful workstations from the likes of Sun and Apollo, which are moving down into the Mac's price range, have their own graphic interfaces.

Apple sued Microsoft and HP over the user interface, claiming that, although some of the ideas came from Xerox, Apple changed and improved upon them enough to claim some rights to them. If the lawsuit is successful, Apple will be able to keep a rather secure hold on the graphical interface. Chances are, though, things won't be that clear-cut.

Since the industry is embracing the interface, and since it was invented outside of Apple, it doesn't seem likely that the suit will do much more than slow the competition and perhaps result in some licensing agreements here and there.

So what's next for Apple? Has it found in HyperCard the technological breakthrough it needs to keep in front of the personal computing pack?

HyperCard adds only a flicker of light to the far-off glimmer of hypertext.

Introduced at the 1987 MacWorld Expo, HyperCard was born in an explosion of media attention and wild

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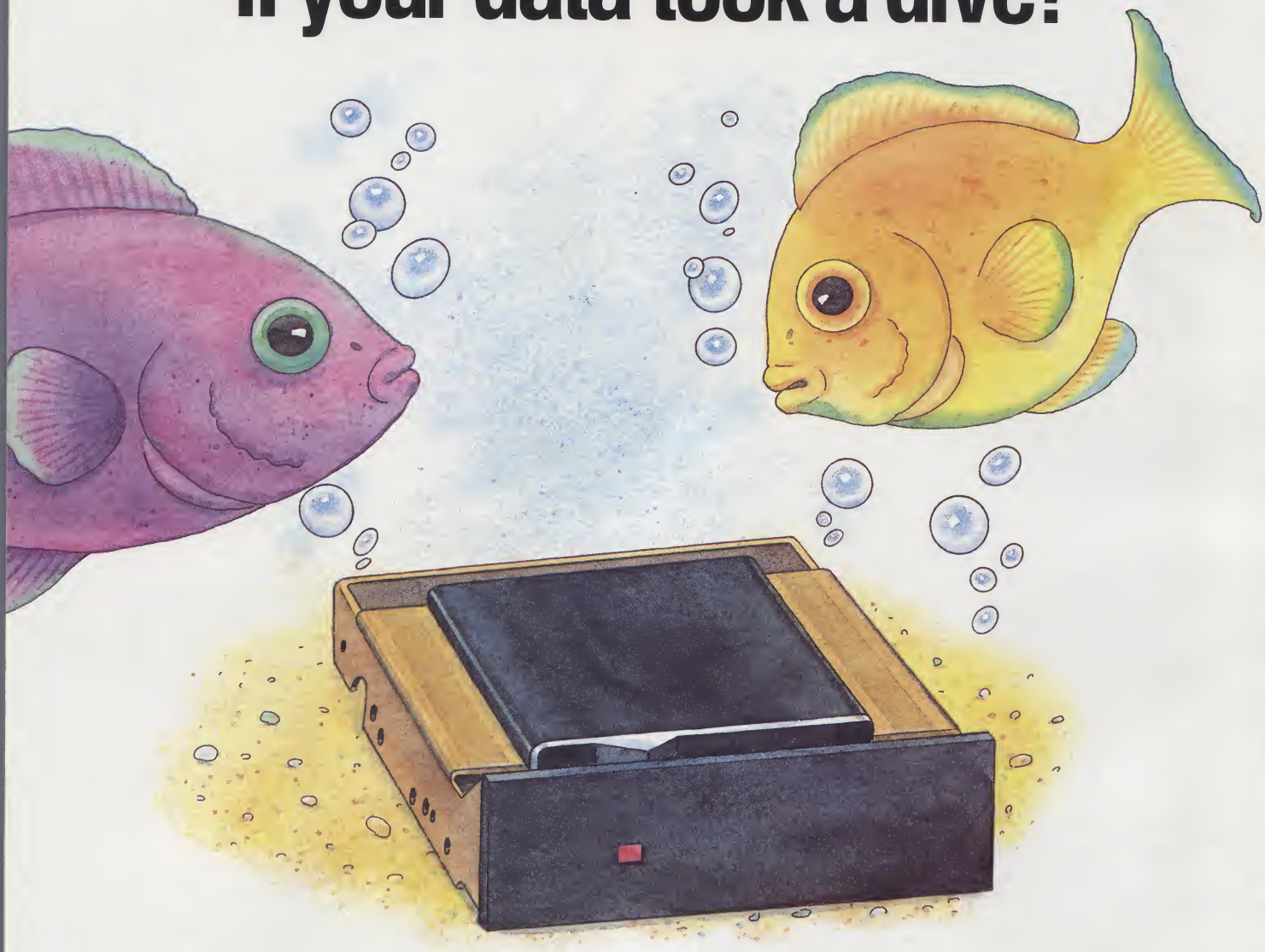

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predictions. Created by Bill Atkinson, one of the original Macintosh programmers, it was billed as "the next VisiCalc." Like that early spreadsheet, which earned personal computers the respect of the corporate world, HyperCard was tagged as "revolutionary." HyperCard, the hype went, would make everyone a programmer and would make information storage and manipulation a snap—even for computer couch potatoes repulsed by Pascal, C, and BASIC.

It could even be John Sculley's key to coming out from behind Steve Jobs's long shadow at Apple. Sure, Steve championed the Mac, but Sculley is no slouch: he led the charge to HyperCard. And neither IBM nor Xerox would have any claim whatsoever on this baby. Its early code name, Wild Card, seemed almost as appropriate as the more marketable moniker that it has been given for public consumption.

Apple's suit won't stop the competition, and neither will HyperCard. It's a stopgap with an innovative language that may be a bit more open to novices than C or Pascal.

What is it?

HyperCard is a programming language hidden in a graphical "hypertext" interface and wrapped in a marketing blitz. Hypertext is an idea that has been running around the computer world for 20 years—the idea that computers should do more than just store text and graphics in linear, booklike [illegible] that they should instead use their [illegible] to cross-reference information to [illegible] various parts of documents to[illegible] any logical pattern the author [illegible]

[illegible]andard encyclopedia, you [illegible] up one subject and find a [illegible] some other topic—which [illegible]en turn to in another vol[illegible] hypertext encyclopedia, you [illegible] click on the key word of an[illegible] subject and be catapulted to the [illegible]vant topic. And because computers can store any form of information, that same encyclopedia could have instant references to sound, video, graphics—you name it.

A hypertext editor would let you create your own links among parts of a document, or between different documents, customizing information to your own patterns of thought. Several companies have created hypertext programs for both the Mac and the PC, the most famous example being Guide, from Owl International. This program has been engaged in such projects as organizing a videodisc of museum art images and cataloging parts for automobile shops.

And Ted Nelson, the fellow who has kept the idea of hypertext alive for years while most everyone else dismissed it as a wild dream, has recently hooked up with Autodesk, maker of the PC-standard CAD program AutoCAD, to complete work on his own hypertext program, called Xanadu.

Hyping Hypertext

HyperCard is a software product that incorporates the pull-down menus and dialog boxes of the Macintosh interface and the basic notion of hypertext. It stores information within itself on "cards"—single images the size of the Macintosh screen—and organizes related cards into "stacks." You can create your own stacks of information, or "stackware," and use the HyperCard program to search through them, sort them, and customize them with your own cross-references. This is fun to do, incidentally, because you create graphic "buttons," position them on a card, and label them in whatever way you like.

Then, when using the stack, you "press" the button using the Mac's mouse and leap to some linked piece of information. Because HyperCard also comes with its own HyperTalk programming language, you can write "scripts"—programs that give buttons much more complex functions. These scripts can do most anything you might do with any other programming language; HyperTalk is very flexible. HyperCard does demand a lot of memory—a full megabyte for practical use—and it doesn't adhere entirely to the Macintosh standard interface (for one thing, you can't change the size of a card, the way you can with regular Mac windows).

So if HyperCard isn't the first hypertext product, and if it is essentially another programming language (albeit with a slick interface), why was everyone so . . . well, so *hyper* about it? And now that it's reached its first birthday,

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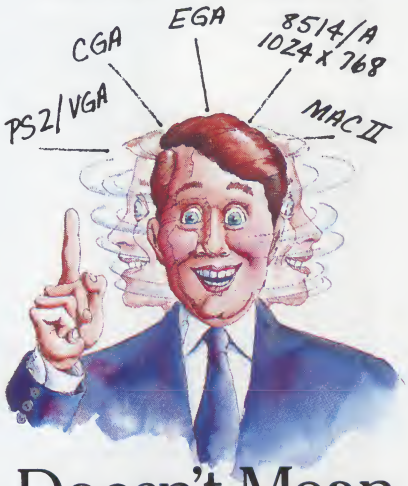

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how hyper do they continue to be?

Well, one thing that makes HyperCard distinctive stems directly from the force behind it. Apple wants to stay at the forefront of the personal computing market. The company gives HyperCard away with every new Mac and sells it for a mere $50. That's cheaper than Turbo Pascal. No surprise, then, that more than a million copies of HyperCard are reportedly circulating after its rookie year.

The computer support industry is taken with Apple and greedy for an exciting new product, a new bandwagon to ride to fame and riches. Several magazines are devoted to HyperCard, along with a slew of books, from the "HyperCard Made Easy" sort to the "Excruciating Details About HyperCard" kind. And you'll find stackware—HyperCard stacks that others have created and are distributing—from here to Kalamazoo.

What's more, it seems you can't pick up a Macintosh magazine these days without seeing articles, reviews, columns, and entire sections that are chockablock with Hyper tips, hints, ideas, script snippets, etc., etc.

But if HyperCard is so easy to use, so intuitive, and so easy to program (Apple claims that 700,000 people have sent replies reporting they use HyperTalk), why do we need 800-page "Complete Guides" on the subject? Why training tapes? Why this whole secondary market of Hyper how-tos?

Who really uses HyperCard?

Me, for one. I put HyperCard on my Mac when it was introduced and got the upgrades that adapted it for better use with CD-ROM; I've discussed it with colleagues and users and read a lot (but by no means all) about it.

Have We Heard This Before?

With all due respect for Apple's interest in staying ahead of the market and making a fortune (what computer company doesn't?), I've nevertheless concluded that HyperCard is just another programming language.

Well, let me modify that a bit. It's a very fast programming tool that can be a wonderful front end for some databases and other types of software. It brings a bit more light to the ideas of hypertext, but it's not likely to change the world or even your computer.

In the past year, the world has witnessed the development of a lot of stacks. HyperCard proponents boast that hundreds appeared on bulletin boards within weeks of the program's introduction. But consider the triviality of much of what we saw. An example: at the 1988 MacWorld Expo in Boston, crowds gathered to view "SmutStack"—pornography in hypertext.

You'll find such silly stacks on Mac bulletin boards, as well. Lamenting the trend, a recent review in a Macintosh weekly newsmagazine nevertheless touted the benefits of a "HyperShopper" stack that contained a database of 1,000 mail order companies and discount stores. Not exactly a revolution in the making.

Important stacks can be found. VersaCAD has put help information and several utility programs for its powerful Macintosh CAD program in stacks. However, you'll need mucho megabytes to use the help and the CAD program side by side. The Oracle Corporation, one of the world's largest software companies, is using HyperCard as the interface for its new Macintosh database management program. Mediagenic, formerly Activision, has built some handy office organization software around HyperCard. Other stacks have been made for organizing sounds, for teaching about Aristotle and anatomy, and for plenty of other subjects.

But doesn't that describe the progeny of any other computing language? Sure, HyperCard gives these products that special "just press the button and go" edge that helps novices, but you can get some of those same effects with other languages. DeskTop Express, for example—a graphic telecommunications program for sending MCI electronic mail—has buttons and a simple interface but has nothing to do with HyperCard.

The Apple-IBM competition in office computing has been healthy for consumers. It's prompted PC companies to consider ease of use in their designs, and it might even help hold down the price of Macs. It's certainly forcing Apple's labs to search for new angles and new technology to add power to the Macintosh.

Apple's suit won't stop the competition, and neither, I think, will HyperCard. It's just a stopgap with an innovative language that may be a bit more open to novices than C or Pascal. It's no quantum leap. And even as a rocket launch, it doesn't penetrate the stratosphere. ◪

Phillip Robinson, an engineer, writes for several computer magazines and edits Desktop Engineering News.

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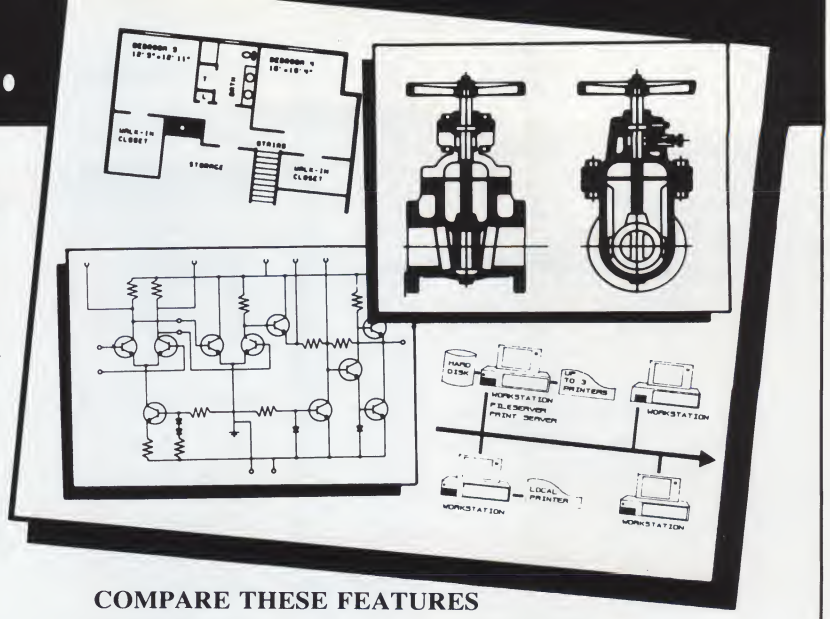

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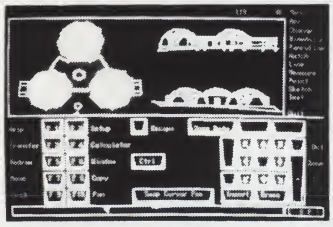

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Coming up in

PC Computing

OS/2: What You Need to Know

OS/2 promises to boost available memory, enable multiuse and multitasking, create an improved interface, and ease network communications. But as yet the benefits are mostly theoretical, and the upgrade costs are substantial. Should you take a wait-and-see approach or go for it? Look for the lowdown next month.

Why Japan Can't Write Software

It's not that they can't write code on the other side of the Pacific. But language problems and a different view of the role of the PC in the workplace put personal productivity software for PCs low on Japanese producers' priority lists. What changes are in store as the market grows? We'll let you know.

386 Laptops

The state of the art in portable computers now means a 386 microprocessor, oodles of RAM, and super-capacity hard disks. Combining dazzling specs with ever smaller packaging, these machines prove you really can take it with you. We review the top-of-the-line 386 systems—those that outperform not only other portables but most deskbound PCs as well.

386 Motherboards

The scoop on five replacement motherboards that let owners of older PCs and ATs share in the action of the 80386 microprocessor's fantastic speed and super multitasking capabilities.

And for the Holidays: Santa Claus Is Coming to Town

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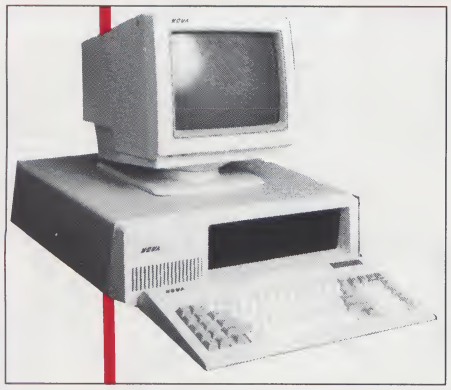

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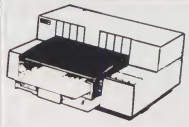

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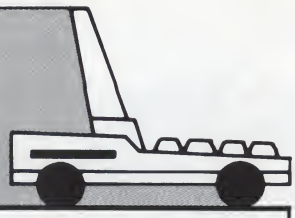

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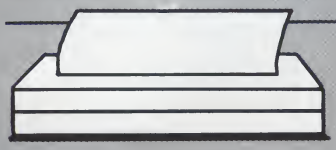

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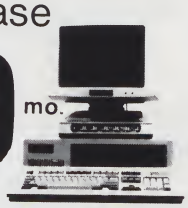

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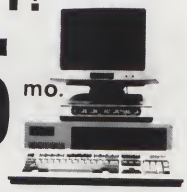

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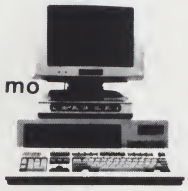

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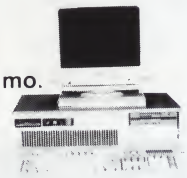

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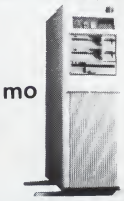

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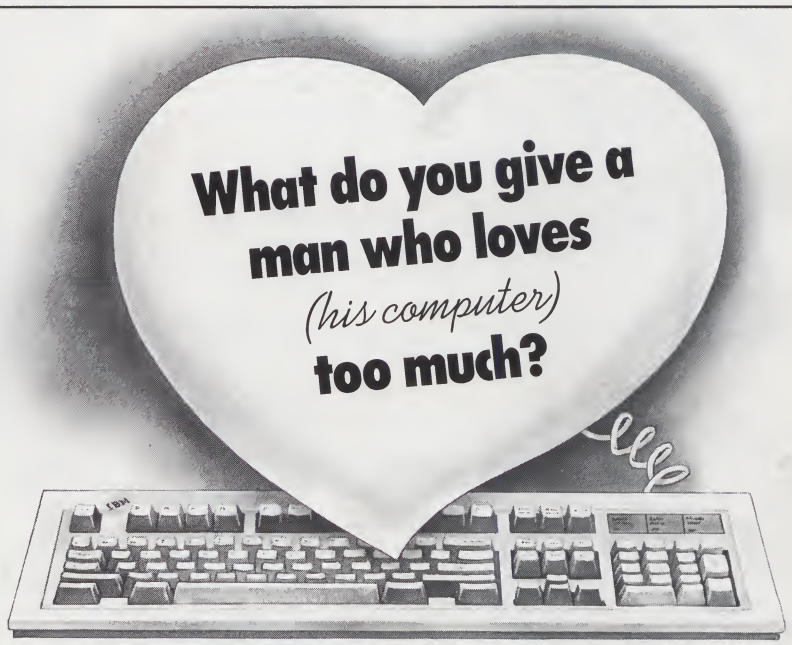

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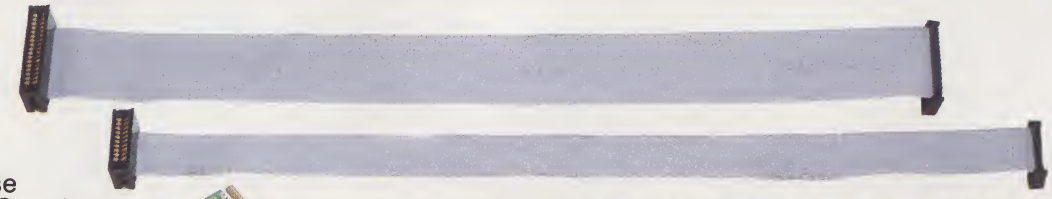

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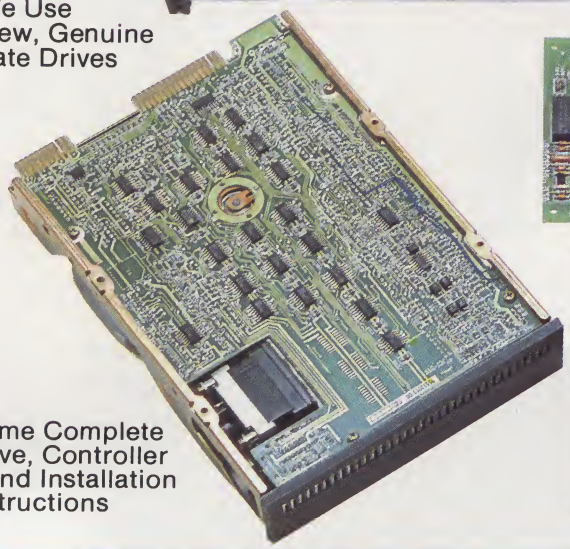

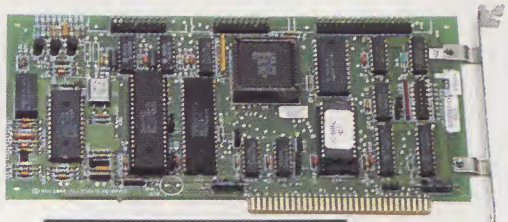

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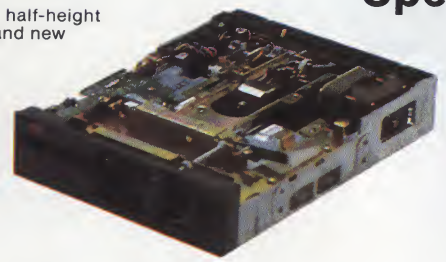

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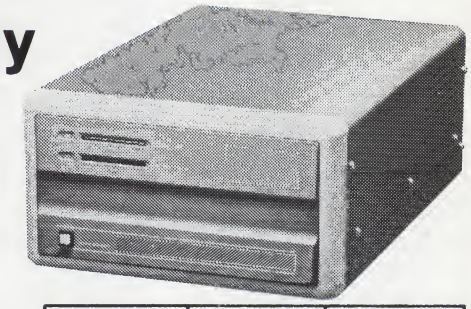

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2	AutoMenu	#608	2nd best seller for 16 weeks! "Make your own easy access menus to run programs"
3	Sidewriter	#523	"Print banners or long spreadsheets sideways"
4	EZ-Form Package	#404	"Business forms ready to be used or changed to fit your needs"
5	PC-File+	#5,#730,#1015	"Jim Button's popular data base"
6	HGCIBM	#870	"Lets your Hercules card run many color (CGA) programs"
7	Greatest Arcade Games	#457	"Donkeykong, Flightmare, Spacewar and more! Color required."
8	Qube-Calc	#696	"Lotus compatible 3-D spreadsheet"
9	Patrick's Best Games	#476	"3-D Packman, Castle, Spacevad, etc. Some require color."
10	PC-Outline	#480	"Thought processor for organizing your ideas"
11	Languages	#612	"Practice French, German, Spanish, Italian and a little Hebrew"
12	PC-Deskteam	#405	"Desktop manager with calculator, clock, etc."
13	Nethack	#1000	"Massive adventure game. Requires hard disk"
14	LQ Printer Utilities	#718	"Print near letter quality on your dot matrix"
15	Home Inventory	#395	"Keep track of what you own"
16	Computer Tutorial	#403	"What's up, DOS? Computerese for beginners"
17	C Tutor	#577, 578	"Makes learning C a breeze!""
18	PC-Write	#78, #627	"Popular word processor with all the bells and whistles"
19	PC-Professor	#105	"Learn how to program in BASIC"
20	Instacalc	#710	"Memory resident spreadsheet that's always ready!"
21	PC-Style	#505	"Analyzes your writing to improve your reports and memos"
22	Image Print	#517	"Near letter quality from your dot matrix"
23	PC-Calc+	#199, #1016, #1017	"Popular spread sheet"
24	PC-Stock	#575	"Buy long, sell short! Track & evaluate stock trends"
25	Fastbucks	#855	"Checking account and financial manager for home or office"
26	PC-Mail	#868, #869	"Prints & sorts mailing labels, name tags, rosters, envelopes"
27	Survey System	#1035, #1036	"Create and analyze your own opinion poll or survey"
28	Amulet of Yendor	#452	"Adventure game of the dungeons sort!"
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38	PC-Chess	#120	"Checkmate!"
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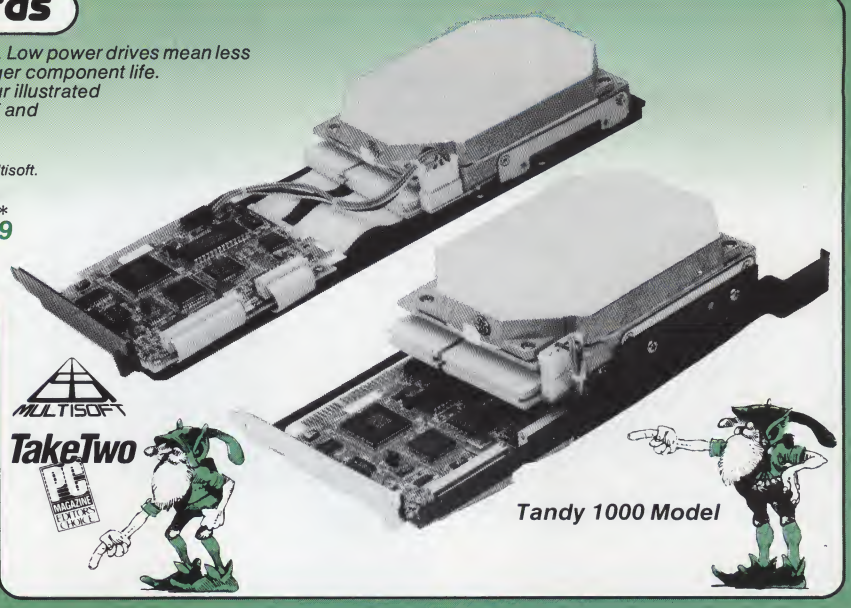

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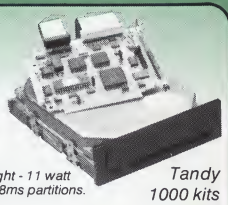

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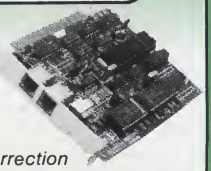

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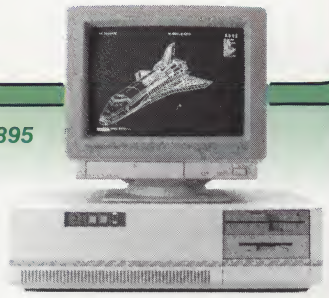

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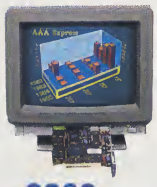

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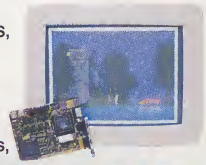

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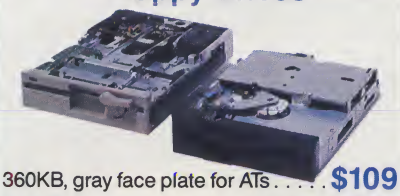

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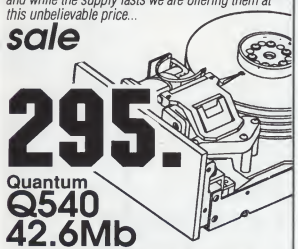

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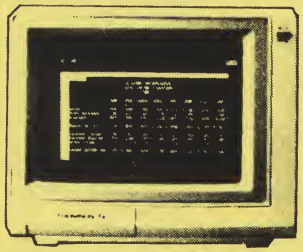

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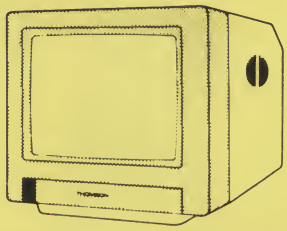

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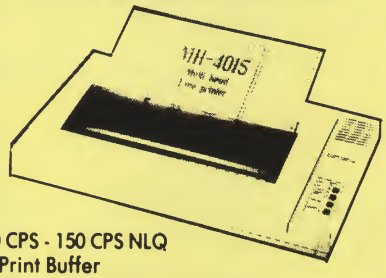

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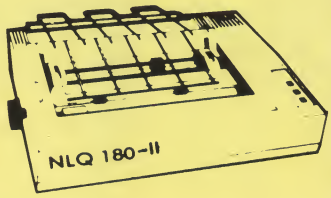

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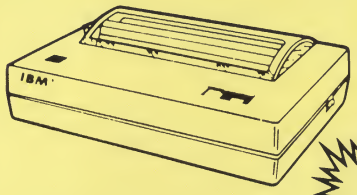

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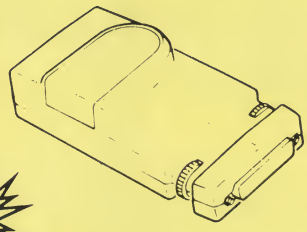

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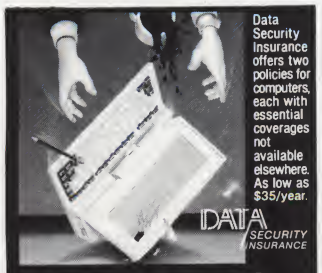

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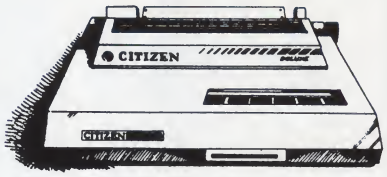

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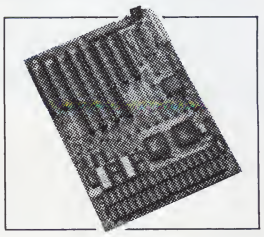

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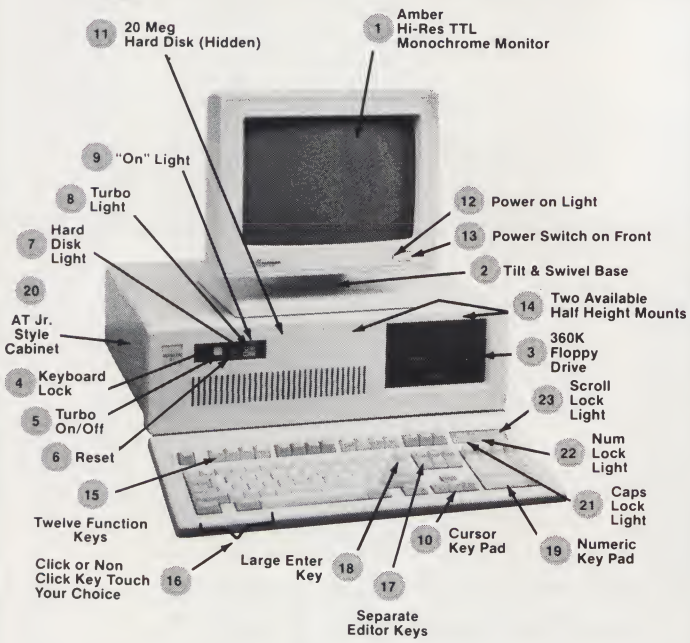

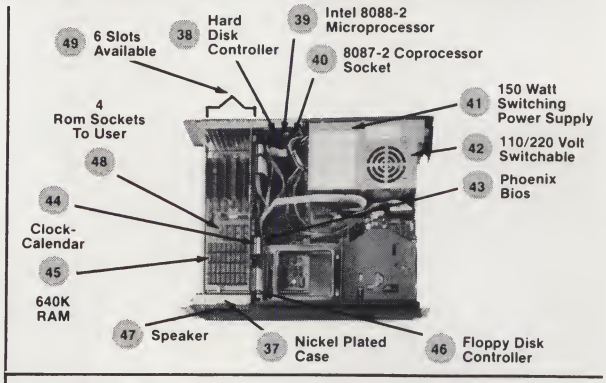

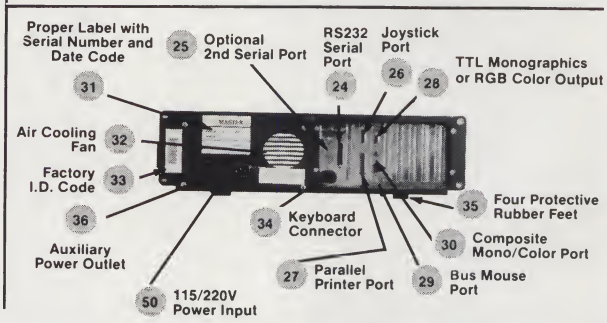

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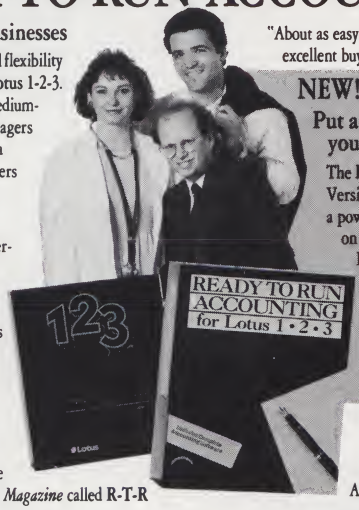

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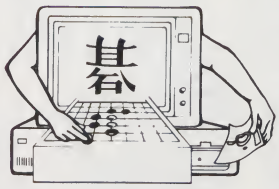

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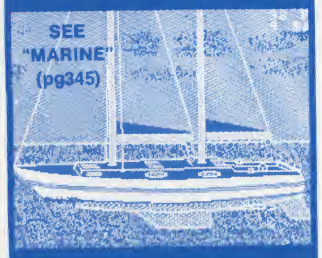

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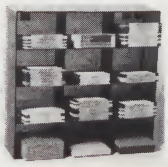

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2 Where do you use your computer (check one only):
d ☐ Home f ☐ Both
e ☐ Business

3 Please estimate the total number of hours you spend on a computer per week (check one only):
g ☐ 5 or less i ☐ 10-20
h ☐ 5-10 j ☐ 20 or more

4 What kind of computers do you currently use (check all that apply):
k ☐ IBM/Compatible
l ☐ MAC/Apple n ☐ Mainframe
m ☐ Minicomputer o ☐ Other

5 Do you plan to buy any of the hardware or software mentioned below in the next 12 months (check all that apply):

Hardware
p ☐ PC
q ☐ Printer/Plotter
r ☐ Monitor
s ☐ Disk/Tape Back-up
t ☐ Add-in Board
u ☐ Communications

Software
v ☐ Accounting
w ☐ Spreadsheet/Financial Planner
x ☐ Project Managers
y ☐ Word Processors
z ☐ Database Managers
1 ☐ Graphics
2 ☐ CAD/CAM
3 ☐ Communications

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URGENT: I NEED INFORMATION ON THESE ITEMS RIGHT AWAY Void after January 31, 1989

9 9 9

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Lucid™ 3-D

1987
Winner of PC Magazine's
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TECHNICAL EXCELLENCE
PC MAGAZINE

You'll love it.

Any cell can contain a com
that you can access

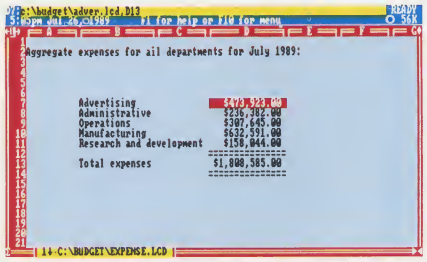

Fig. 1 Let's get the detail on those ad costs. Just move the widebar to that cell and press one key (Grey +).

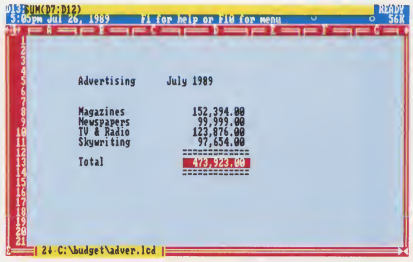

Fig. 2 Here we are, instantly. Notice the lower left corner showing we are on level 2. You can go down or up.

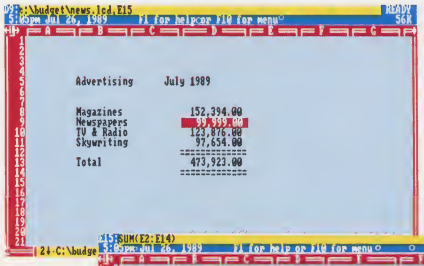

Fig. 3 We want more detail, so let's go to News – papers. Just press the Grey + key.

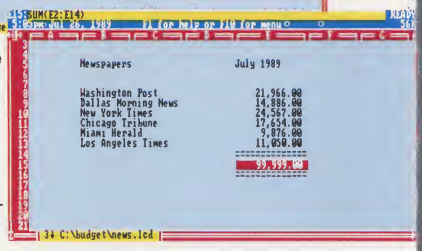

Fig.4 Now, instantly we are on level 3. Each level is a different spreadsheet. You could now move to the New York Times and see the detail on that figure. There is no limit to the levels you can go. Move right down to transaction level if you like.

What Makes Lucid 3-D So Special

In the screen examples you can see Lucid is really three dimensional. Any cell of the spreadsheet can contain a complete other spreadsheet that you can access with a single keystroke. It is as simple as the pictures show. And you don't have to write formulas to do that.

All you do is go look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

Everything about Lucid works that way. Users say "*It is so intuitive that I really don't need a manual.*" That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid in a recent article said that, "*If there ever was an interface idea so good it ought to be stolen and widely used, this is it.*"

What he was talking about is a new menu approach that follows a simple design concept: it is easier to recognize than it is to remember. As choices are made on a menu that take you to lower levels you always can see exactly where you came from and where you are going. The complete menu path is always visible. You cannot get lost several levels down. This means you never have to remember a command, you just flow right to it.

Plus, no matter where you are on a menu or what you are doing, just press function key F1, and you will get a help screen specific to that command or action. Or if you want to know about any subject you can pop up an index of over 600 topics and select the one you want.

Notepad Behind Every Cell

Another 3-D feature is that any cell can also contain a multiple page note that you instantly access with a single keystroke. You can write notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

> "I've been calling it an 'Everyman's Spreadsheet', and I think that's how the market will position it. It's much more than an inexpensive alternative to 1-2-3."
>
> Jim Seymour, Columnist, PC Magazine, PC Week

Speed

Lucid 3-D is truly revolutionary. It is fast, fast, fast! It is incredibly quick in performing calculations because it doesn't recalculate every cell every time you insert an entry. Instead, it only re-calculates the specific cells that are affected by your change. This is called minimal recalc. Lucid also has a remarkable innovation called background recalc in which you are given control of the cursor the moment calculations affecting your viewing screen are completed. Other calculations you don't see continue on in the background during the next commands. The end result of this powerful combination is you rarely wait for a recalculation with Lucid. You find out what instantaneous is all about.

Lucid Learns

Lucid 3-D also lets you teach it in any combinations of keystrokes so that involved sequences can be done with single keys. Plus more than just remembering keystrokes, Lucid allows you to create Macros with loops, procedures and conditional branching amazingly all done automatically with simple menus. You can create your own menus that show the new features you have taught it. Another great feature is

plete other spreadsheet
s with a single key.

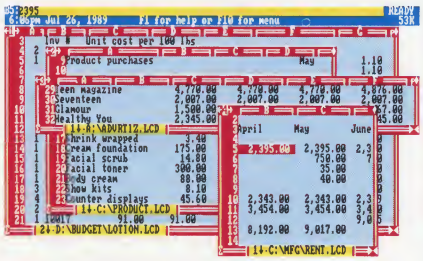

Fig. 5 Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many 3-D levels as you like. No one else can do that.

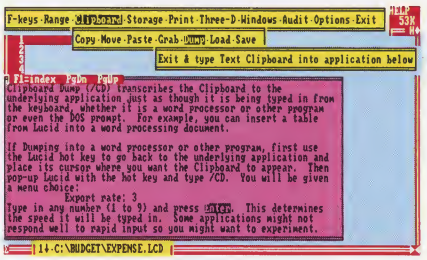

Fig. 6 We need those budget figures in the Word Perfect letter we are writing. Clipboard Dump does it right now.

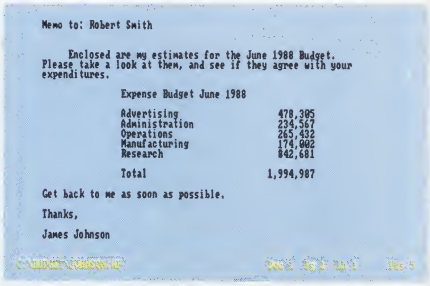

Fig. 7 Here it is right in Word Perfect (or any word processor) just like you typed it. You can go the other way just as easily.

you can make your custom menus work like Lucid where one choice can take you down a level to a whole new set of choices. What's nice is that they will work from one spreadsheet to another.

Mouseability

Lucid 3-D was designed for both keyboard enthusiasts and mouse lovers alike. You can take your pick. Designed around the mouse from the ground up, the interface is smooth and natural. You select files to load from directory lists. Everything is point and click. What's more, any Lucid 3-D menu selection can be "moused" and the response time is "right now" instead of the sluggish "a little bit behind you" feel of add-on mouse menu systems like those you've seen with 1-2-3.

A window pops up with a library of function names you can page through with the mouse. Select, click and it's in the formula with no typing required. You even have a label window that you can fill (from the keyboard) with favorite labels and names so that you can insert them later with the mouse. There's even a pop-up calculator to insert numbers so you don't have to go to the keyboard very often.

It really permits that feeling of becoming one with your work. Lucid 3-D has windows of user defined range names as well as the macros named by the user that can be selected just by pointing and clicking. Icons that are easy to grab with the mouse let you resize and move the spreadsheet window with the ease you would expect. Plus you can go anywhere on the sheet by moving the mouse and clicking on the spreadsheet borders. And remember, Lucid is designed so that any of those features are done with or without the mouse easily and quickly.

Audit

When you are staking a big decision on information gained from a spreadsheet you need to be certain that you have made no mistakes. Lucid 3-D offers five audit displays and printouts.

Even if you don't plan to abandon 1-2-3, Lucid makes sense. Files are converted between them with ease so there's not an interoffice compatibility problem. This means you can have the power and fun of Lucid 3-D without having to upset your present systems.

We are excited about Lucid 3-D. But don't take our word for it, take us up on our 60 day offer.

Call us on our order line number and we will ship your order the very next day. This $149 offer will end as soon as our dealer network is fully stocked. But in the mean time we invite you to try Lucid as part of our "spread the news" campaign. Just pick up the phone and call us. We accept all major credit cards or you can order COD.

Lucid™ 3-D

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Lucid 3-D™ is the best spreadsheet you can buy.

Don't take our word for it. Use Lucid 3-D for 60 days. Return it for a full refund if not completely satisfied. Plus, instead of the $199 list price, an introductory spread-the-word price of $149.

Winner of PC Magazine's 1987 Award for Technical Excellence

Lucid 3-D is priced to sell at $199, but we want thousands of people using Lucid everyday, all over the world. We invite you to be a part of that group. The reason we are offering Lucid for only $149, on a sixty day return for a full refund, is simple. Preliminary user testing of the product produces the same results over and over. People tell us they would never work without Lucid 3-D again. Even folks continuing to work with 1-2-3.

Memory Resident

That's because the idea of a memory resident spreadsheet makes sense, one that you can pop-up instantly while working in your word processor or any other program. Lucid lets you cut anything on the screen and paste it right into Lucid, or cut anything from a Lucid worksheet and paste into the application below. You can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas.

Lucid 3-D was developed over the past two years with countless, exhaustive hours of planning and programming to produce something spectacular. This is a product that works the way we dreamed a spreadsheet would function. Everyone who has seen it says things like, "*Lucid 3-D is how software of the 1990's will look and perform*", or even more to the point "*This is the way I thought a computer should work*". You'll see, Lucid is exciting.

Masterwork

We could go on at great length about all the features and innovations in Lucid, but Lucid is more than a bag of features. What is most important is the pride and craftsmanship that went into its creation. It is a masterwork. The overall feel is tight and polished. In fact Paul, Somerson, editorial director of *PC Computing*, used one word to describe it, "*Slick*".

PCSG has built a reputation as a development laboratory producing products that you know are excellent. In 1983 PCSG dominated the Model 100 laptop market with ROM based software that every reviewer rated as

POP-UP 3 DIMENSIONAL SPREADSHEET

excellent. In 1985 we produced Lightning, the pioneer and award winning Disk speed up software. In 1986 we developed the Breakthru 286 accelerator board that blew everything else out of the water, and later we topped ourselves with the Breakthru 12. Now in 1988 those who have worked with Lucid 3-D tell us "*you have done it again. This is software everyone should have.*"

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